Joint Site Permit Application to the Minnesota Public Utilities Commission for the Benton Solar Project

Benton Solar Project
Benton County, Minnesota

Minnesota Public Utilities Commission Docket Numbers:
IP7115/GS-23-423 and IP7115/ESS-24-283

Prepared for

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ABBREVIATIONS AND DEFINITIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AC	alternating current
ACS	American Community Survey
AIMP	agricultural impact mitigation plan
Applicant	Benton Solar, LLC
associated facilities	Defined in Minnesota Administrative Rules § 7850.1000 to include electrical collection system, roads, fencing and security measures, substation, operations and maintenance facility and supervisory control and data acquisition system, meteorological evaluation tower, stormwater basins, and temporary features [e.g., laydown yards]).
AQI	Air Quality Index
ARMER	Allied Radio Matrix for Emergency Response
Benton Solar	Benton Solar, LLC
Benton Solar Project	a 100-megawatt alternating current nameplate capacity solar energy conversion facility and a 100-megawatt battery energy storage system, and associated facilities, to be located in Minden Township, Benton County, Minnesota.
BESS	battery energy storage system
BMP	best management practice
BMS	battery management systems
CFR	Code of Federal Regulations
CH	County Highway
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
dBA	A-weighted decibel(s)

DC	direct current
EAP	Emergency Action Plan
ECOS	Environmental Conservation Online System
ECS	Ecological Classification System
EJScreen	Environmental Justice Screening Tool
EMF	electric and magnetic field
EPA	U.S. Environmental Protection Agency
EPS	Economic Profile System
Facilities	permanent and temporary features associated with the Project
GHG	greenhouse gas
GIA	Generator Interconnection Agreement
GIS	geographic information system
GRE	Great River Energy
GWP	global warming potential
HDD	horizontal directional drilling
HUC	Hydrologic Unit Code
HVAC	heating, ventilation, and air conditioning
IFC	International Fire Code
IPaC	Information for Planning and Consultation
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
kg	kilogram(s)
kV	kilovolt(s)
m	meter(s)
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health

MDNR	Minnesota Department of Natural Resources
MDOC	Minnesota Department of Commerce
MET	meteorological evaluation tower
mG	milligauss
Minn. R.	Minnesota Administrative Rules
Minn. Stat.	Minnesota Statutes
MISO	Midcontinent Independent System Operator
mmBtu	1 million British thermal units
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	megawatt(s)
MWh	megawatt hour(s)
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEER	NextEra Energy Resources, LLC
NFPA	National Fire Protection Association
NHIS	Natural Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health
NO_2	nitrogen dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O&M	operations and maintenance
O_3	ozone
Pb	lead
PCS	power conversion system

PCU	power conversion unit
PDSI	Palmer Drought Severity Index
permanent	in the context of Facilities, existing for the life of the Project
PLC	programmable logic controller
$PM_{2.5}$	particulate matter 2.5 microns in diameter or smaller
PM_{10}	particulate matter 10 microns in diameter or smaller
POI	point of interconnection
Preliminary Development Area	the collective boundary encompassing all Facilities where development is expected to occur, with the exception of the operations and maintenance building, and areas of both temporary and permanent disturbance; 631.9 acres.
Project	a 100-megawatt alternating current nameplate capacity solar energy conversion facility and a 100-megawatt battery energy storage system, and associated facilities, to be located in Minden Township, Benton County, Minnesota.
PV	photovoltaic
PWI	Public Water Inventory
ROW	right-of-way
SCADA	supervisory control and data acquisition
SH	State Highway
SHPO	State Historic Preservation Office
Site	the 951.4-acre area for which Benton Solar has full land control. This area encompasses the Preliminary Development Area, the solar energy conversion facility, the battery energy storage system, and associated facilities, with the exception of the operations and maintenance building that is anticipated to be located off-site in an existing office space, and allows for flexibility in final Project design.
SMU	soil map unit
SO_2	sulfur dioxide
Solar Facility	the 100-megawatt alternating current nameplate capacity solar energy conversion facility portion of the Benton Solar Project or Project
SPCC plan	spill prevention, control, and countermeasures plan
SSA	sole source aquifer
SSURGO	Soil Survey Geographic database
SWCA	SWCA Environmental Consultants

SWPPP	stormwater pollution prevention plan
temporary	in the context of Facilities, existing during construction and subsequently removed
THPO	Tribal Historic Preservation Officer
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V	volt(s)
VMP	vegetation management plan
WEG	wind erodibility group
WHPA	wellhead protection area

COMPLETENESS CHECKLIST

Authority	Application Section(s)
Minnesota Statutes 216E.04 – Alternative Review of Application	
Subdivision 1. Alternative Review - An applicant who seeks a site permit or route permit for one of the projects identified in this section shall have the option of following the procedures in this section rather than the procedures in section 216E.03. The applicant shall notify the commission at the time the application is submitted which procedure the applicant chooses to follow.	1.0; 1.4
The requirements and procedures for alternative review apply to the following projects: **Subdivision 2(8)** Large electric power generating plants that are powered by solar energy; and **Subdivision 2(9)** Energy storage systems. **Subdivision 3** Application – The applicant for a site or route permit for any of the project listed in subdivision 2 who chooses to follow these procedures shall submit information as the commission may require, but the applicant shall not be required to propose a second site or route for the project. The applicant shall identify in the application any other sites or routes that were rejected by the applicant and the commission may identify additional site or routes to consider during the processing of the application. The commission shall determine whether an application is complete and advise the applicant of any deficiencies.	1.0; 2.5
Minnesota Administrative Rules Part 7850.1900, subpart 1 – Application Contents	
A. a statement of proposed ownership of the facility as of the day of filing and after commercial operation;	1.2.2
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;	1.2.1; 1.2.2
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;	2.5
D. a description of the proposed large electric power generating plant and all associated facilities, including the size and type of the facility;	2.1; 2.2; 3.1
E. the environmental information required under subpart 3;	4.0
F. the names of the owners of the property for each proposed site;	1.2.2; Figure 2
G. the engineering and operational design for the large electric power generating plant at each of the proposed sites;	3.0; 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;	2.6
I. an engineering analysis of each of the proposed sites, including how each site could accommodate expansion of generating capacity in the future;	2.7; 3.1
J. identification of transportation, pipeline, and electrical transmission systems that will be required to construct, maintain, and operate the facility;	3.1.3, 3.1.4, 31.6
K. a listing and brief description of federal, state, and local permits that may be required for the project at each proposed site; and	1.4.2
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.	1.0

Authority		Application Section(s)
Minnesota Administrative Rules Part 7850.1900, subpart 3 – Environmental Information Requirements		
A.	a description of the environmental setting for each site or route;	4.1
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;	4.2
C.	a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;	4.3
D.	a description of the effects of the facility on archaeological and historic resources;	4.4
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;	4.5
F.	a description of the effects of the facility on rare and unique natural resources;	4.5.9
G.	identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route; and	4.7
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.	4.2–4.7

1 INTRODUCTION

Benton Solar, LLC (Benton Solar or Applicant), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER), is requesting two Site Permits from the Minnesota Public Utilities Commission (Commission) for the Benton Solar Project, a 100-megawatt (MW) alternating current (AC) nameplate capacity solar energy conversion facility (Solar Facility) and a 100-MW battery energy storage system (BESS), and associated facilities to be located in Minden Township, Benton County, Minnesota (Benton Solar Project or Project) (Figure 1). The Project would produce, on average, up to approximately 201,480 megawatt hours (MWh) of solar energy annually, which is enough to power 21,500 homes. The Project will also include a 115-kilovolt (kV), 0.5-mile-long[1] transmission line to deliver energy from the Project to the electric grid. The proposed transmission line, which meets the definition of a high-voltage transmission line under Minnesota Statutes (Minn. Stat.) § 216E.01, subd. 4,[2] is presented in the Route Permit Application submitted to the Commission by Benton Solar pursuant to Minn. Stat. Chapter 216E, and Minnesota Administrative Rules (Minn. R.) Chapter 7850 (Commission Docket IP7115/TL-23-425).

The Site is the 951.4 acres for which Benton Solar has full land control. The Site is located 4.0 miles east of St. Cloud, Minnesota, in a rural setting. Residences and small businesses are scattered throughout the area near the Site, and land use is primarily agricultural (Section 4.2.10). The Site is generally bounded to the north by County Highway (CH) 50 (30th Street NE); to the east by CH 25 (75th Avenue NE); to the south by 2nd Street SE; and to the west by 55th Avenue NE. State Highway (SH) 95 intersects the Site near its center, and several local county and township roads also occur within the Site. Additionally, existing transmission lines are located in the Site (Section 4.2.10).

The Site encompasses the Preliminary Development Area, 631.9 acres, which is the area where development is expected to occur and encompasses all Facilities, with the exception of the operations and maintenance (O&M) building that is anticipated to be located off-site in an existing office space, and the transmission line which is addressed in the Route Permit Application (Commission Docket IP7115/TL-23-425). Facilities include all temporary and permanent features associated with the Project (Table 1-1). In the context of Facilities, "temporary" describes Facilities that will be in place only during construction and then removed, and "permanent" describes Facilities that will be in place for the life of the Project (25–30 years). Associated facilities as defined in Minn. R. § 7850.1000 include electrical collection system, roads, fencing and security measures, substation, O&M facility and supervisory control and data acquisition (SCADA) system, meteorological evaluation tower (MET), stormwater basins, and temporary features (e.g., laydown yards).

Site Permits are required prior to construction, in accordance with the Minnesota Power Plant Siting Act (Minn. Stat. Chapter 216E) and Minn. R. Chapter 7850. The Solar Facility falls within the Minnesota Power Plant Siting Act's definition of a large electric power generating plant under Minn. Stat. § 216E.01, subd. 5. The BESS meets the definition of an energy storage system as defined under § 216E.01, subd. 3a. The Applicant seeks approval of the Site Permits under the alternative review process provided under Minn. Stat. § 216E.04, subd. 2 (8 and 9), and Minn. R. § 7850.2800–7850.3900. Other permits and approvals that may be required for the Project are listed in Section 1.4.

[1] All measurements presented in this Application are approximate and hereafter have been rounded to the nearest tenth unless otherwise noted.

[2] Minn. Stat. § 216E.01, subd. 4 defines a high-voltage transmission line as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kV or more and is greater than 1,500 feet in length." The high voltage transmission line proposed by Benton Solar meets this definition because the voltage (115 kV) and length (approximately 2,270 feet) exceed the thresholds provided in the definition.

Table 1-1. Estimated Facility Acreages in the Preliminary Development Area

Facility	Acres*	
	Long-term Impacts	**Short-term Impacts∞**
Solar Facility		
Solar panels (including vegetative space between panels) †	510.8	0.0
Collection lines	0.0	39.7
Access roads‡	12.2	0.0
Laydown yards	0.0	5.4
Substation	5.0	0.0
Meteorological evaluation tower(s)	0.0	0.0
Power conversion units	0.1	0.0
Stormwater basins (permanent)	6.3	0.0
Stormwater basins (temporary)	0.0	3.0
Subtotal	**534.3**	**48.1**
Battery Energy Storage Site		
Laydown yard	0.0	1.2
Battery	0.5	0.0
Future augmentation battery	0.2	0.0
Power conversion systems	0.1	0.0
Future augmentation inverter	0.0	0.0
Subtotal	**0.8**	**1.2**
Operations and Maintenance Building§	**0.0**	**0.0**
Total	**535.1**	**49.3**

* Facilities and their estimated acreages are based on the preliminary site plan. Final acreages may change pending final design. Additionally, there is some overlap between certain Facilities, which therefore may share acreage in this table.

† The Project consists of 260,208 individual panels. Each individual panel measures 7.5 × 3.75 feet. Tracker rows are generally 189.1 to 279.9 feet in length and consist of three strings of solar panels. These dimensions are preliminary and pending final design and equipment selection.

‡ The majority of access roads will be 10.0 feet wide with a 5.0-foot shoulder on either side. Access roads may be wider along internal road intersections, curves, and turnarounds. Two access roads, leading to the substation and BESS, will be 20.0 feet wide with a 2.0-foot shoulder on either side. Total length of access roads is 7.6 miles.

§ The O&M building is part of the Project but is anticipated to be contained in an existing office building located off-site, as described in Section 3.1.7. It is included here for totality of the Project description.

∞ Disturbances will be short-term, and areas will be restored as described in this Application following completion of construction.

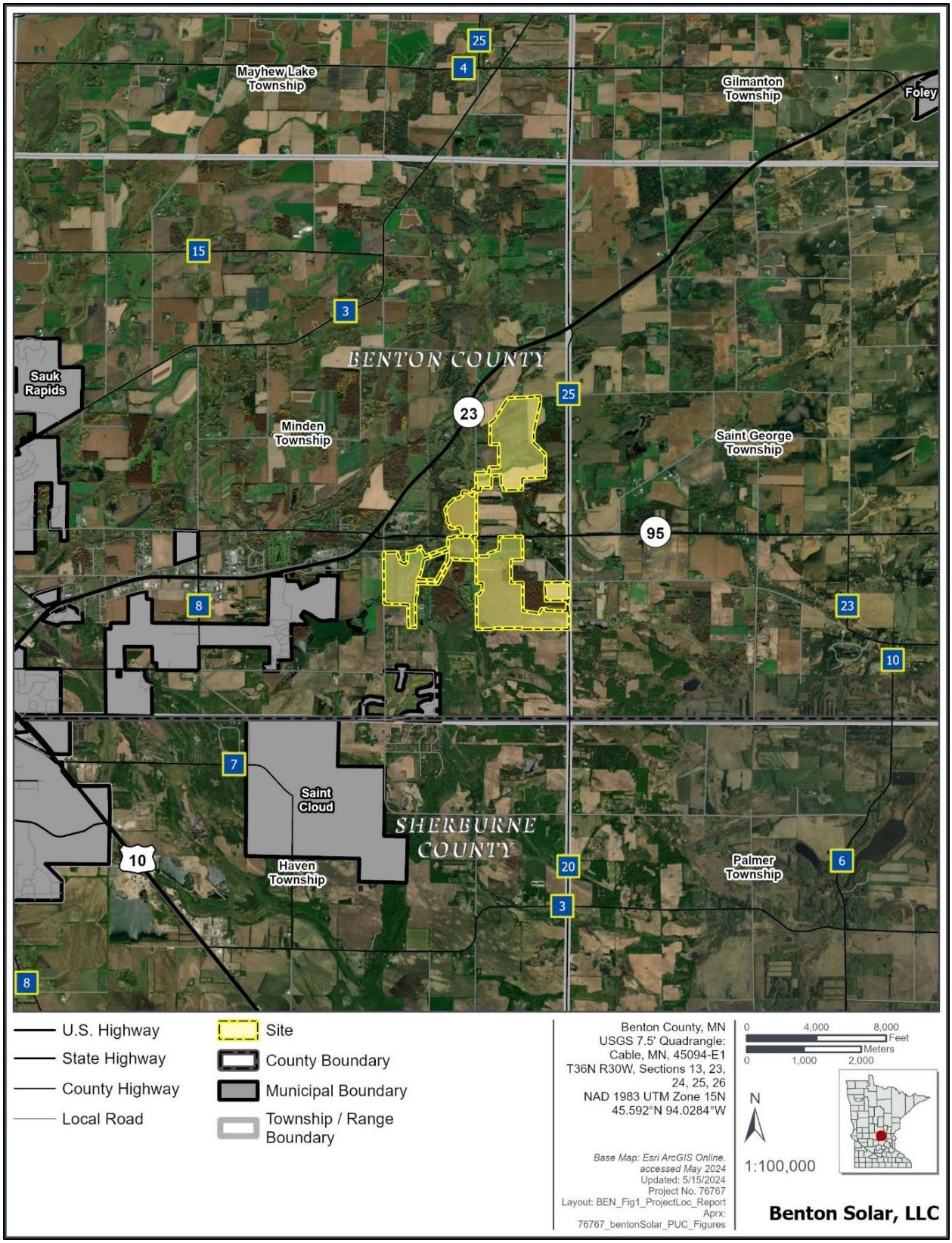

Figure 1. Project location.

A Site Permit Application submitted by an independent power producer under Chapter 216E for a solar energy generating system does not require a Certificate of Need (CON) (Minn. Stat. § 216B.243 subd. 8(a)(7) and Minn. Stat. Chapter 216E). Energy storage systems are exempt from the CON requirement (Minn. Stat. § 216B.243 subd. 8(a)(9). Because Benton Solar, an independent power producer, is submitting a Site Permit Application for a solar energy generating system under Chapter 216E, the Project is exempt from the CON requirement. The transmission line is also exempt from the CON requirements because it does not meet the definition of a large energy facility to which those requirements apply (Minn. Stat. § 216B.2421, subd. 2(2 and 3)).

1.1 Purpose

The Project will meet the growing customer demand for renewable energy resources and directly address Minnesota's goal and mandate to provide 100% carbon-free energy for the state by 2040. The Project implements applicable energy planning requirements, as presented in the Renewable Energy Objectives (Minn. Stat. § 216B.1691) and Governor Tim Walz's "One Minnesota Path to Clean Energy" (see Minn. Stat. § 216B.1691, subd. 2(f); Minn. Stat. § 216C.05; and Minn. Stat. § 216E.02, subd. 1). Specifically, the Project will provide renewable solar energy, a zero carbon emissions energy source; support Minnesota's ability to provide customers with cost-effective, wholesale electric service; help meet the growing demand for renewable energy; and drive economic growth, as follows:

- The Solar Facility's 100-MW output would generate enough electricity to power 21,500 homes annually.
- The Project would benefit the local community through production tax payments paid to Benton County and Minden Township. Benton County would receive production tax payments of approximately $200,000 annually over the life of the Project ($6,000,000 total assuming a Project life of 30 years). Additionally, as the township hosting the Project, Minden Township would receive approximately $50,000 annually ($1,500,000 total assuming a Project life of 30 years) (Section 4.2.6).
- The citizens of Minnesota would benefit through Benton Solar's purchasing of local construction materials; providing jobs for construction and O&M; and providing landowner lease payments.

The BESS will have a power output of 100 MW and a storage capability of 400 MWh. Integration of the BESS into the Project will have a positive impact on the grid because the BESS can shift Project output from the peak of solar generation (e.g., noon) to times of peak demand (e.g., early evening hours). Depending on final design, a BESS can also provide other grid services including frequency response and voltage support. The BESS could also smooth, or even out, Project output as needed based on weather conditions (e.g., cloudy days). The Solar Facility and BESS are planned to operate in tandem with one another, which will reduce impacts associated with the variability of solar energy generation.

The Applicant is working toward securing an agreement related to the sale of power generated by the Project.

1.2 Applicant Information

1.2.1 Permittee and Contact Information

The Permittee for the two Site Permits is:

Benton Solar, LLC
c/o NextEra Energy Resources, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

The authorized representatives for the Applicant are:

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1.2.2 Statement of Ownership

Benton Solar will develop, construct, own, and operate the Project. Affiliates of NEER have been operating renewable energy projects in Minnesota for more than 22 years. Although Benton Solar does not own or have a direct financial interest in any other wind or solar farms located in Minnesota, NEER affiliates have financial interests in several wind and solar projects in Minnesota:

- The 110-MW Buffalo Ridge Wind Project in Lincoln County (in operation);
- The 109.7-MW Walleye Wind Project in Rock County (in operation);
- The 62.3-MW Marshall Solar Energy Project in Lyon County (in operation);
- The 78.8-MW Minnesota Community Solar Gardens Project in various counties (in operation);
- The 15-MW Gopher Battery Storage Project in Anoka and Isanti counties (in operation); and
- The 260-MW Dodge County Wind Project in Dodge County (approved by Commission).

As of December 31, 2023, NEER affiliates have 37 gigawatts of total generating capacity with 8 gigawatts consisting of photovoltaic (PV), distributed generation, and solar thermal facilities.

Benton Solar has secured necessary land rights in the form of lease option agreements to construct and operate the Project. Upon reaching the end of the operational life of the Project (25–30 years) and

termination of lease option agreements, land used would be returned to the underlying landowners if no contract renewals are secured.

If the Commission grants the requested Site Permits and Route Permit (see Commission Dockets IP7115/GS-23-423, IP7115/ESS-24-283, and IP7115/TL-23-425, respectively), Benton Solar plans to construct, own, operate, and maintain the Facilities and will be responsible for fulfilling all of the conditions set forth in the Site Permit and Route Permit granted by the Commission.

1.3 Project Schedule

The anticipated Project schedule for the Site Permits, construction, testing, and commercial operation is presented in Table 1.3-1.

Table 1.3-1. Project Schedule

Activity	Comments	Timing
Land acquisition	–	Qtr. 1 2022–Qtr. 3 2023
Generator Interconnection Agreement execution	–	December 7, 2022
Surplus Generator Interconnection Agreement execution	-	Qtr. 3 2025
Submit Joint Site Permit Application	–	Qtr. 3 2024
Joint Site Permit Application review	–	Qtr. 3 2024–Qtr. 32025
Site Permits issuance	–	Anticipated–Qtr. 3 2025
Other permits	Benton Solar will obtain all required permits and approvals prior to Project construction, as applicable	Qtr. 3 2024–Qtr. 2 2026
Equipment procurement	–	Qtr. 1 2024–Qtr. 1 2027
Construction	–	Qtr. 2 2026–Qtr. 4 2027
Commercial testing	–	Qtr. 2 2027–Qtr. 4 2027
Commercial operations date	–	Qtr. 4 2027

1.4 Required Project Permits

1.4.1 Site Permits

Two Site Permits, one for the Solar Facility and one for the BESS, are required from the Commission for Project construction, in accordance with the Minnesota Power Plant Siting Act (Minn. Stat. Chapter 216E) and Minn. R. Chapter 7850. The Solar Facility falls within the Minnesota Power Plant Siting Act's definition of a large electric power generating plant under Minn. Stat. § 216E.01, subd. 5. The BESS meets the definition of an energy storage system as defined under § 216E.01, subd. 3a. Benton Solar is applying for both Site Permits under the alternative review process provided under Minn. Stat. § 216E.04, subd. 2(8 and 9), and Minn. R. 7850.2800–7850.3900. The Applicant filed a Notice of Intent by Benton Solar, LLC to Submit a Route Permit Application and Joint Site Permit Application under the Alternative Permitting Process to the Commission on August 20, 2024.

1.4.2 Other Potential Permits and Approvals

The Project may require several federal, state, and local permits prior to Project construction. All required permits, approvals, and licenses will be obtained from the applicable agency concurrently or following issuance of the Site Permits by the Commission. Potential permits and approvals that may apply to the Project are presented in Table 1.4-1. Section 5 and Appendix A provide information regarding Benton Solar's outreach and coordination with federal, state, and local agencies and governments.

Table 1.4-1. Potential Permits and Approvals that May Apply to the Project

Agency	Type of Permit, Approval, or Coordination	Status and Timing	Need or Description
Federal			
U.S. Army Corps of Engineers	Section 404 permit, Clean Water Act	To be obtained prior to Project construction, as needed	Required for dredging or fill in jurisdictional waters of the United States
U.S. Environmental Protection Agency (EPA)	Spill prevention, control, and countermeasures plan	To be obtained prior to Project construction, as needed	Required for facilities with aboveground oil storage of more than 1,320 gallons
State of Minnesota			
Minnesota Public Utilities Commission	Route Permit	To be obtained prior to Project construction	Required for projects that meet the definition of a high-voltage transmission line under Minn. Stat. § 216E.01, subd. 4
Minnesota Pollution Control Agency (MPCA)	Section 401 Water Quality Certification	To be obtained prior to Project construction, as needed	Required for Section 404 individual and nationwide permits
	National Pollutant Discharge Elimination System general permit for stormwater discharges associated with construction activities	To be obtained prior to Project construction	Required for construction activities that disturb 1 or more acre of land
Minnesota Department of Health (MDH)	Well construction permit	To be obtained prior to Project construction, as needed	Required for the installation of a water supply well
Minnesota Department of Labor and Industry	Electrical inspection request	To be obtained during Project construction and prior to Project operation	Required to comply with state electrical codes
Minnesota Department of Natural Resources (MDNR)	Water appropriation permit	To be obtained prior to dewatering activities, as needed	Required if trench dewatering (more than 10,000 gallons of water per day or 1 million gallons per year) is needed
	Work in public waters permit	To be obtained prior to construction, as needed. Efforts will be made to avoid impacts to wetlands and waterways.	Required for activities in wetlands or waterbodies on the Public Water Inventory (PWI)
MDNR, Division of Lands & Minerals	Utility crossing license	To be obtained prior to construction, as needed	Required for the passage of any utility crossing on public land or waters
Minnesota State Historic Preservation Office (SHPO)	Cultural and historic resources review; state and national registers of historic sites review	Obtain concurrence prior to Project construction. Complete SHPO consultation prior to construction.	Required for compliance with state permits, or affects to state-registered properties, or require National Historic Preservation Act Section 106 compliance

Agency	Type of Permit, Approval, or Coordination	Status and Timing	Need or Description
Minnesota Department of Transportation (MnDOT)	Application for utility accommodation on trunk highway right-of-way (ROW)	To be obtained prior to construction, as needed	Required for installing utilities along, across, or on trunk highway ROW
	Access/driveway permit	To be obtained prior to construction, as needed	Required for construction or modification of a driveway/access road using the MnDOT ROW
	Oversize/overweight permit	To be obtained prior to construction, as needed	Required for oversize and/or overweight vehicles delivering equipment, materials, and supplies that exceed applicable MnDOT height, length, and weight limits
Local*			
Benton County	Moving permit	To be obtained prior to construction, as needed	Required for transporting oversized and/or overweight loads on county roads
	Application for driveway/ entrance	To be obtained prior to construction, as needed	Required for modifying or creating a new driveway access to county or township roads
	Excavation and/or obstruction permit	To be obtained prior to construction, as needed	Required for work and placement of facilities within public road ROW
	Floodplain alteration permit	Unlikely to be needed	Required for development within a floodplain
	Shoreland alteration permit	To be obtained prior to construction, as needed	May be required if an area within the shoreland is being filled or graded, or if vegetation is being altered
	Minnesota Wetland Conservation Act wetland replacement plan approval	To be obtained prior to construction, as needed	Required for activities affecting wetlands

* Development of solar farms within agricultural districts is an interim permitted use (Benton County Development Code) (Benton County 2020). Benton County Development Code Section 11.7 regulates the installation of solar energy systems not otherwise subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act (Minn. Stat. Chapter 216E). Benton County Development Code does not regulate or reference battery energy storage systems. Benton Solar is committed to working with Benton County to address any concerns or additional permits that may be required prior to construction. Because the Project requires two Site Permits from the State of Minnesota, the Benton County Development Code does not apply to the Project.

2 PROJECT DESCRIPTION

The following sections provide a description of the Project, including the size and location, prohibited and exclusion sites, alternatives considered, cost analysis, and potential future expansion.

2.1 Overview

The Site is located in Minden Township, Benton County, Minnesota, 4.0 miles east of St. Cloud (see Figure 1). Benton Solar has land control for the entirety of the Site, which is comprised primarily (905.4 acres, 95.2% of the total) of agricultural land. Figure 2 shows participating landowners and parcels as required by Minn. R. 7850.1900. Benton Solar proposes to interconnect the Project at Great River Energy's (GRE's) Benton County Substation in Benton County, Minnesota, located south of the Site. The proximity of the Site to the GRE Benton County Substation will require a 0.5-mile-long 115-kV transmission line. The transmission line is addressed in Commission Docket IP7115/TL-23-425.

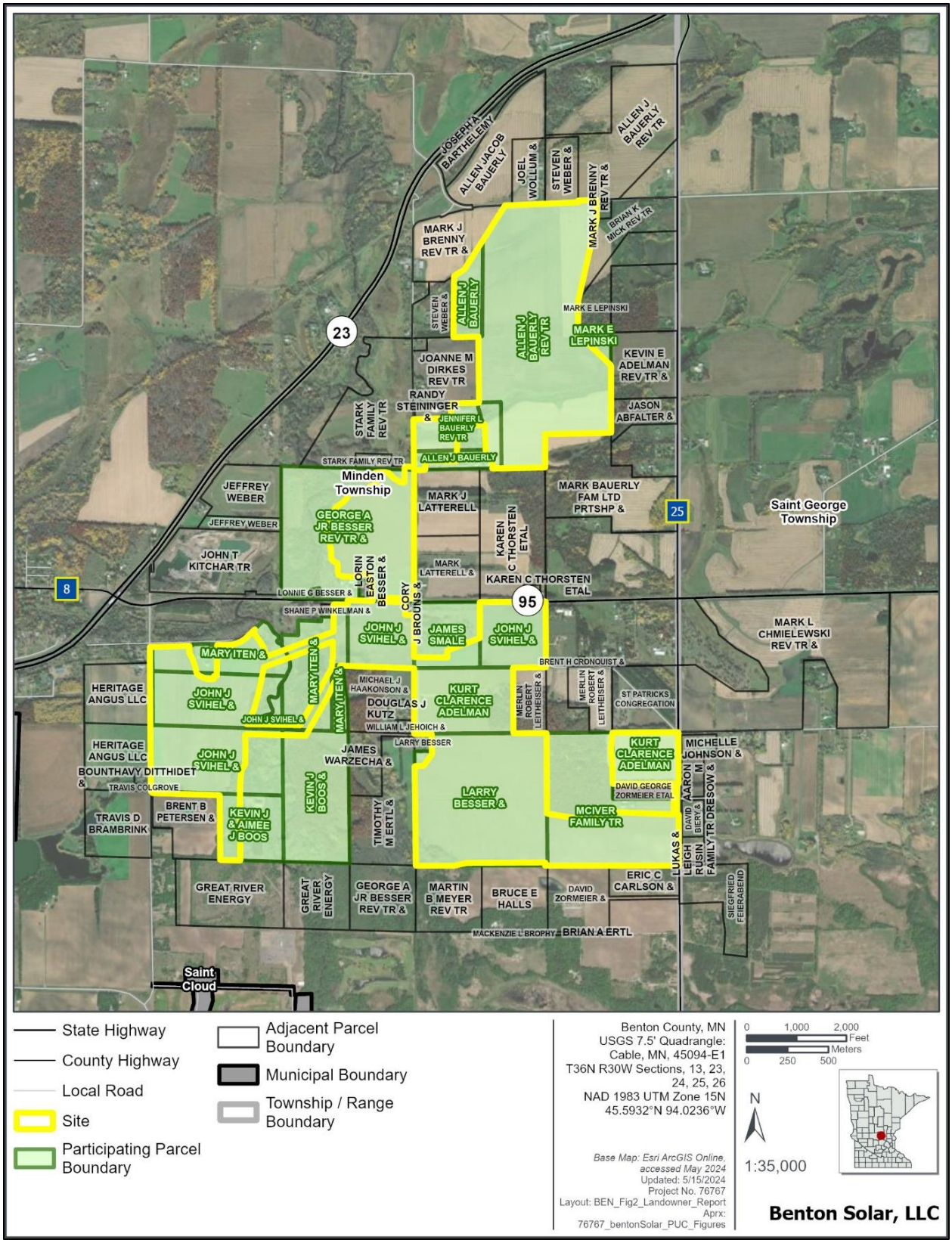

Figure 2. Participating landowners and parcels.

Benton Solar filed a Generator Interconnection Agreement (GIA) Application with Midcontinent Independent System Operator (MISO) for the Solar Facility. MISO is an independent, not-for-profit organization that coordinates the transmission of electric power across 15 states, including Minnesota. MISO approval through a GIA is required to connect the Project to the electrical transmission system. Benton Solar submitted the interconnection request into the MISO Definitive Planning Phase study process in 2019 and has an executed GIA with MISO (dated December 7, 2022). Benton Solar is in the process of filing a surplus agreement with MISO for the BESS.

The Project includes the 100-MW Solar Facility paired with a 100-MW BESS. The BESS may provide frequency response, capacity on demand, generation smoothing, and shifting and/or firming of the power output from the Solar Facility. The BESS will have a power output of 100 MW and a storage capability of 400 MWh. The BESS itself would not generate energy but would simply store electrical energy and release it to the grid when desired. The BESS would be a critical part of the Project, working in tandem with the Solar Facility to provide net power generation that is more predictable and cost-effective than that provided by a system without a BESS.

The Site is the 951.4 acres for which Benton Solar has full land control. The Preliminary Development Area (631.9 acres) is the area where development is expected to occur. This Application provides the Project's preliminary site plan (see "30% Civil Plan" provided in Appendix B) and associated Preliminary Development Area. The preliminary site plan and Preliminary Development Area reflect Benton Solar's intent to optimize the Project's electrical output generation and efficiency and minimize the Project's potential impacts to land use, environmental resources, and the surrounding community. The preliminary site plan is subject to micrositing per final engineering and construction activities and may change. However, Benton Solar anticipates that the final design will be similar to the preliminary site plan and Preliminary Development Area presented in this Application and that all Facilities, with the exception of the O&M building that is anticipated to be located off-site, will be constructed within the Site presented herein. The Site and Preliminary Development Area are illustrated in Figures 1 and 3, respectively. Facilities are described in detail in Section 3.1. Benton Solar has not finalized equipment selection.

The Site includes two corridors in the west for routing the underground medium-voltage electric collection system: a northern (preferred and encompassed by the Preliminary Development Area) and southern (alternative) option. The northern corridor is preferred from an engineering and environmental perspective; however, this area also has the least siting flexibility due to known physical and resource constraints. The southern corridor may be used should Benton Solar deem the northern corridor to be technically unfeasible. Both corridors have been surveyed for environmental and cultural resources.

The Site is advantageous for solar development based on 1) optimal solar resource; 2) environmental setting (i.e., where disturbance to other resources such as wetlands was minimized); 3) proximity to a point of interconnection (POI) to optimize equipment efficiency, minimize line loss, and avoid the need to construct a larger transmission line; and 4) the locations where landowners were willing to participate in the Project (see Section 2.3.1). As described in Section 1.2.2, Benton Solar has secured the necessary land rights, which consist of lease option agreements for Project construction and operation.

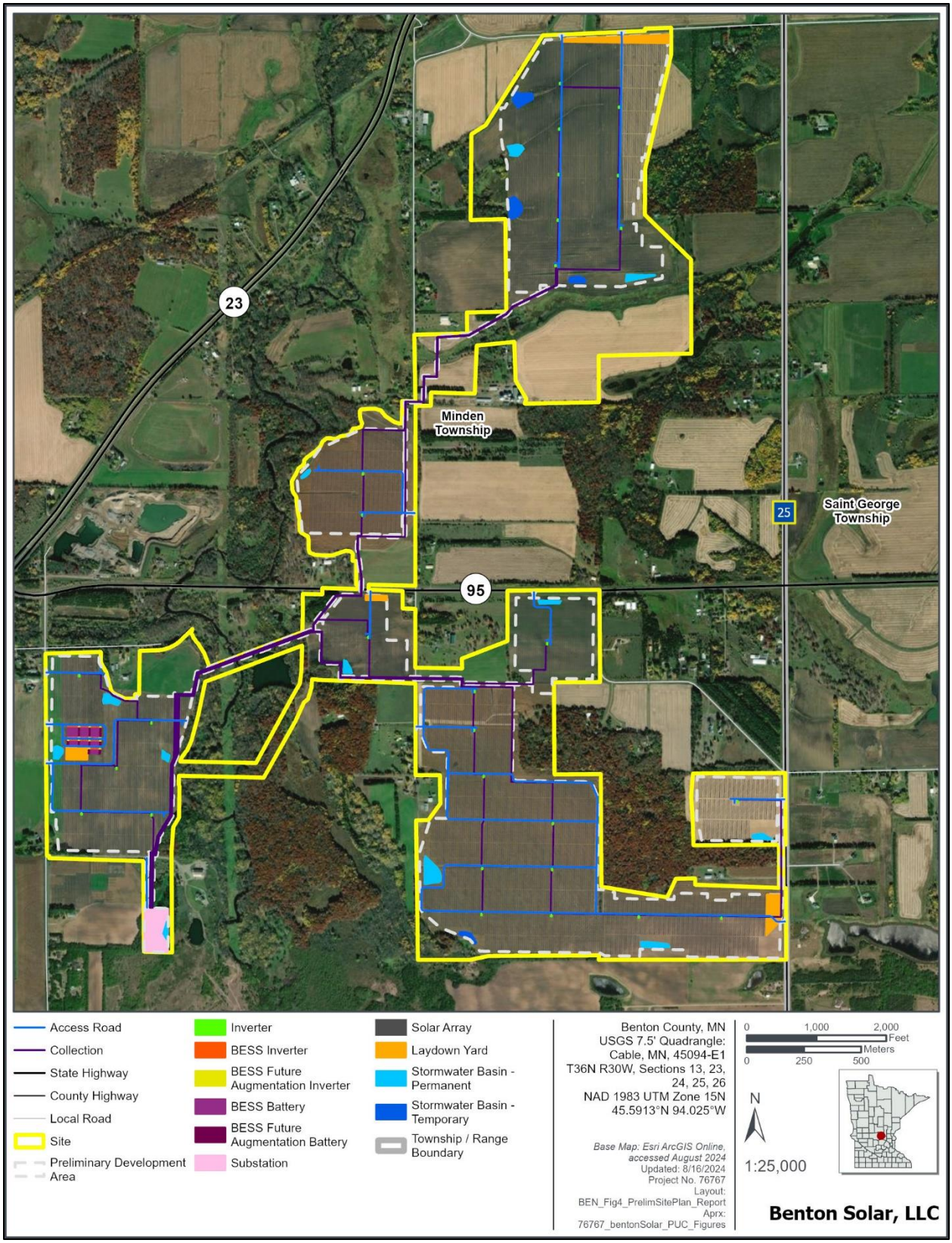

Figure 3. Preliminary site plan.

2.2 Size and Location

The proposed Project is a 100-MW AC nameplate capacity Solar Facility paired with a 100-MW BESS and associated facilities to be located in Minden Township, Benton County, Minnesota. The Project would produce up to 201,480 MWh of solar energy annually. Table 2.2-1 provides the Township, Range, and Section of all areas included within the Site. Benton Solar plans to develop a 115-kV transmission line of 0.5 mile in length (and with a right-of-way [ROW] extending 50.0 feet to either side of centerline) to deliver energy from the Project to the electric grid. Benton Solar is applying to the Commission for a Route Permit pursuant to Minn. Stat. Chapter 216E and Minn. R. Chapter 7850 (Commission Docket IP7115/TL-23-425), and the transmission line is addressed in the Route Permit Application.

Table 2.2-1. Project Location

Political Boundary	Township	Range	Section
Minden Township	36N	30W	13 and 23–26

2.3 Prohibited and Exclusion Sites

Minn. R. 7850.4400 prohibits siting power generating plants in areas of cultural and environmental significance. These rules include the following:

- **Prohibited Sites.** Under subp. 1 of this rule, large electric power generating plants cannot be sited in areas of natural and/or historic importance, including national historic sites; national and state parks; wildlife refuges; wilderness areas; nature conservancy preserves; national wild, scenic, and recreational riverways; national monuments; national historic districts; and state scientific and natural areas. The Site is not located in these exclusion areas.
- **Site Exclusions where Alternatives Exist.** Under subp. 3 of this rule, applicants cannot site electric power generating plants in the following areas unless there is no prudent and feasible alternative: state-registered historic sites; state historic districts; state wildlife management areas; county parks; metropolitan parks; designated federal and state trails; designated trout streams; and rivers identified in Minn. Stat. § 85.32, subd. 1. The Site is not located in these exclusion areas.
- **Prime Farmland Exclusion.** Under subp. 4 of this rule, large electric power generating plants cannot be sited on more than 0.5 acre of prime farmland per MW of net generating capacity, unless there is no feasible and prudent alternative. Prime farmland is defined as "land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion" (Natural Resources Conservation Service [NRCS] 1981). Typically, soils in prime farmland are sufficiently well-drained and are not excessively erodible during the growing season. Table 2.3-1 presents the farmland classifications for the Site and Preliminary Development Area. Within the Site, 501.1 acres (52.6%) are not prime farmland; 435.3 acres (45.8%) are farmland of statewide importance; 9.6 acres (1.0%) are prime farmland if drained; and only 5.4 acres (0.6%) are prime farmland. Within the Preliminary Development Area, 326.2 acres (51.6%) are farmland of statewide importance; 295.2 acres (46.7%) are not prime farmland; 5.9 acres (0.9%) are prime farmland if drained; and 4.6 acres (0.7%) are prime farmland.

Table 2.3-1. Farmland Classification within the Site and Preliminary Development Area

Farmland Classification	Area of Site (acreage)	Percentage of Site	Area of Preliminary Development Area (acreage)	Percentage of Preliminary Development Area
Not prime farmland	501.1	52.6%	295.2	46.7%
Farmland of state importance	435.3	45.8%	326.2	51.6%
Prime farmland if drained	9.6	1.0%	5.9	0.9%
Prime farmland	5.4	0.6%	4.6	0.7%
Total*	**951.4**	**100.0**%	**631.9**	**100.0**%

* Totals may vary slightly due to rounding.

Further guidance regarding prime farmland is provided by the Minnesota Department of Commerce (MDOC) on evaluating siting alternatives in *Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives* (MDOC 2020). Benton Solar's analysis of factors identified in the MDOC guidance related to the consideration of alternative sites is discussed below.

2.3.1 Factors Driving Choice of Region

According to MDOC's *Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives*, the following factors should be considered when siting in a region with prime farmland:

- Solar resource in the proposed region versus otherwise compliant areas;
- Process of determining available interconnection points; and
- Efforts in investigating developable sites (sites with appropriate topography and willing participants) in otherwise compliant areas.

Ultimately, the Site was selected based on: 1) optimal solar resource; 2) environmental setting (i.e., where disturbance to other resources such as wetlands was minimized); 3) proximity to a POI; and 4) where landowners were willing to participate in the Project. Each of these factors is discussed further below.

2.3.1.1 SOLAR RESOURCE

Benton Solar assessed the state's solar resource and selected the Site based on the high solar resource available in this region of the state (Image 2.3-1). As shown in Image 2.3-1, this region of Minnesota has a high solar resource, and there is a positive correlation between a high solar resource and the presence of prime farmland. Areas with no prime farmland correlate to a lower solar resource (Brink et al. 2015; Soil Survey Staff 2023). However, Benton Solar has proposed to site the Project where only 10.5 acres (1.7%) of the Preliminary Development Area is classified as prime farmland or prime farmland if drained.

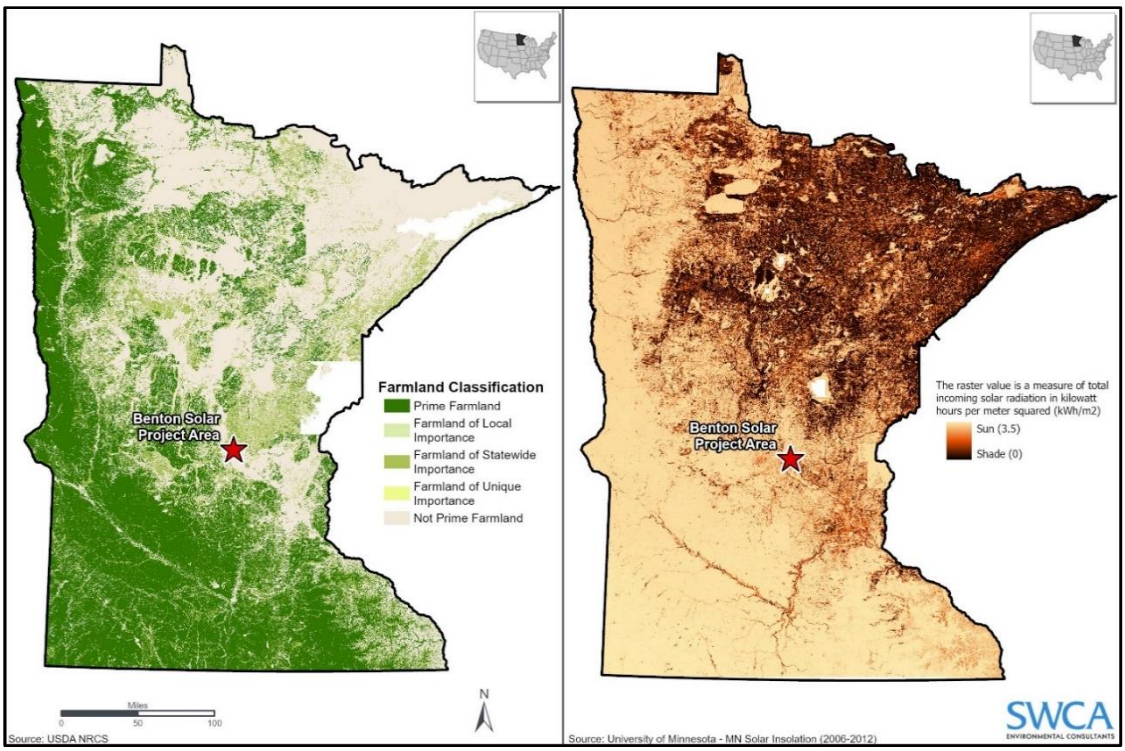

Image 2.3-1. Prime farmland and the solar resource in Minnesota.

2.3.1.2 ENVIRONMENTAL CONSTRAINTS

Benton Solar studied areas for geotechnical risks, potential presence of threatened and endangered species, proximity to culturally sensitive areas, environmental contamination, current land use conflicts, and clear and uncontested title. The specific Site constraints considered include the following:

- Public waters;
- Lands owned or managed by state or federal agencies;
- Minnesota Department of Natural Resources (MDNR) Minnesota Biological Survey (MBS) sites of biodiversity significance;
- MDNR mapped native plant communities and native prairie;
- Calcareous fens;
- MDNR rare species records;
- MDNR and Minnesota Land Cover Classification System regionally significant ecological areas and corridors;
- Scientific and natural areas;
- Mississippi River Corridor Critical Area restoration priority areas;
- Conservation easements;
- Wilderness areas; and
- Flood hazard zones.

An environmental resource constraints analysis is provided in Figure 4. Benton Solar analyzed these constraints to select an area that minimized impacts to these resources. This factor is discussed further in Section 4.1.

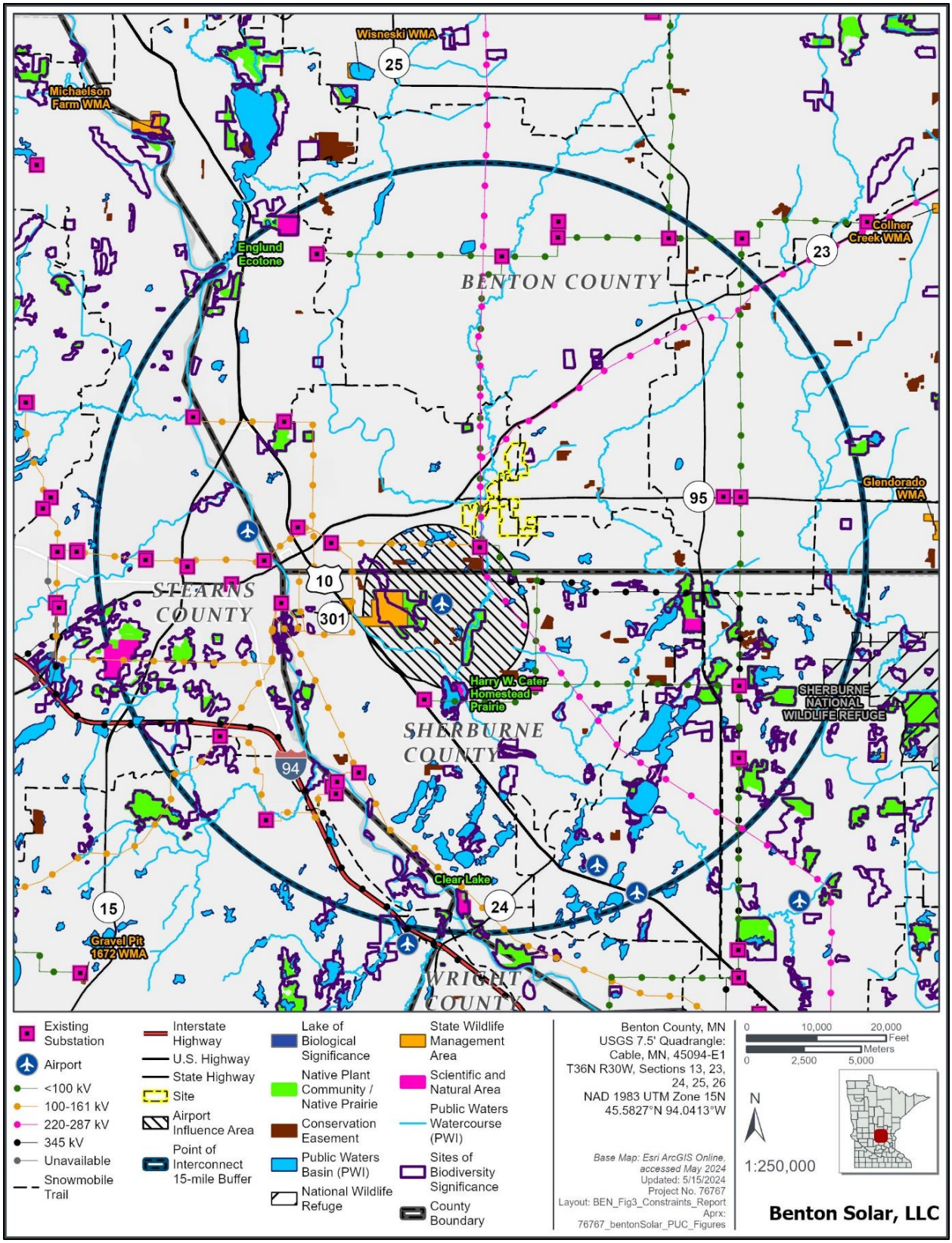

Figure 4. Constraints.

2.3.1.3 PROXIMITY TO POINT OF INTERCONNECTION

Benton Solar also considered the proximity to viable POIs that had open capacity to utilize. Proximity to the POI optimizes equipment efficiency, minimizes line loss, and avoids the need to construct a larger transmission line.

Prior to 2018, NEER conducted a detailed analysis to identify the current POI and location surrounding the POI for potential development. In 2019, the Project was submitted into the MISO queue. NEER's search was limited to the southern half of the state due to the optimal solar resource and relatively open land present in the region. Within the southern portion of the state, NEER screened for substations and transmission lines with available capacity. Based on NEER's internal databases, these sites also were anticipated to have low or no network upgrade requirements. NEER then screened available land within 7.0 miles of the identified POIs due to the financial limitations of constructing a longer transmission line (i.e., construction cost, easement acquisition cost, and electrical losses). One and a half to 2.0 miles of transmission was determined to be the upper limit of what a project of this size could support. If the land was not currently encumbered by other easements (e.g., for wind or other utility-scale solar sites), contained minimal wetlands, streams, transmission lines, pipelines, roads, or other obstacles that would limit the buildable land, and was within the 7.0-mile radius, it was pursued as a viable site location.

The existing GRE Benton County Substation was identified as having available capacity and low interconnection costs. The Site was chosen over others for its proximity to the POI, capacity at the POI, supportive and willing landowners, and no environmental fatal flaws.

2.3.1.4 LANDOWNER PARTICIPATION

Lastly, as mentioned above, Benton Solar considered the willingness of landowners to participate in the Project. Once an area passed the constraints tests, Benton Solar approached landowners to better understand their thoughts on a project of this kind being sited in the area and to negotiate voluntary leases and easements. The receptiveness of the landowners willing to participate helped to determine the current Site as landowner participation is critical to the overall success of the Project.

2.3.2 Prime Farmland

2.3.2.1 CONSIDERATIONS

Guidance found in *Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives* states that "the State of Minnesota has dual mandates to advance solar energy production and protect prime farmland" (MDOC 2020:1). The guidance is "meant to assist developers in defining feasible and prudent in relation to siting alternatives" (MDOC 2020:1).

According to the guidance, when a project is justifiably located within a region of the state that may conflict with prime farmland exclusion sites, the following factors should be assessed:

- Alternative sites in nonprime farmland in proximity to an interconnection site;
- Avoidance of other prohibited areas; and
- Consideration of alternative site configurations or technologies.

2.3.2.2 ANALYSIS

Much of Minnesota's southeastern region is characterized as high solar resource and prime farmland (see Image 2.3-1). Table 2.3-2 depicts the percentage of total acres of soils designated as prime farmland and prime farmland if drained that occur in Benton County and neighboring counties.

Table 2.3-2. Acres of Soils Designated as Prime Farmland and Prime Farmland if Drained in Benton County and Surrounding Counties

County	Prime Farmland (percent)	Prime Farmland If Drained (percent)
Benton	0.6%	4.7%
Morrison	14.7%	6.4%
Mille Lacs	0.9%	2.8%
Sherburne	3.6%	1.0%
Stearns	29.8%	15.5%

Benton Solar designed a preliminary site plan that minimizes disturbance of potential impacts to prime farmland by implementing the following strategies:

- Siting the Project in Benton County, which has limited coverage of soils classified as prime farmland (0.6%) and prime farmland if drained (4.7%);
- Avoiding areas of prime farmland within Benton County: the Project is uniquely positioned such that only 10.5 acres (1.7%) of the Preliminary Development Area is classified as prime farmland and prime farmland if drained;
- Minimizing the Preliminary Development Area to limit areas that would require grading and soil disturbance;
- Minimizing siting of Facilities on slopes to reduce the need for grading;
- Minimizing access road footprints to reduce grading and soil disturbance;
- Using electrical collection systems to reduce the need to trench between each solar panel, limiting soil disturbance; and
- Reducing the space between solar panels to the extent possible to reduce the overall size of the Preliminary Development Area while maintaining a safe distance to access during O&M activities.

The current Site is the result of a series of refinements that have occurred throughout the development process to account for factors such as landowner interest, nearby proposed or operating projects, and environmental features present in the general area such as conservation easements, sites of biodiversity significance, state scientific and natural areas, native prairies, karst features, and water resources. The preliminary site plan is provided in Figure 3 and Appendix B.

2.4 Mitigation and Offsetting Benefits

The Project will convert cultivated cropland to regionally appropriate vegetation. When converting cultivated cropland to other uses, mitigation efforts can reduce impacts (e.g., to soils) and ultimately provide overall benefits to the environment. Benton Solar has prepared an *Agricultural Impact Mitigation Plan* (AIMP) outlining the Project's potential impacts to agricultural resources and related best management practices (BMPs) and mitigation measures (Appendix C). Benton Solar has also prepared a vegetation

management plan (VMP) describing how vegetation will be installed, monitored, and managed throughout the life of the Project (Appendix D). The AIMP and VMP are summarized below.

2.4.1 Agricultural Impact Mitigation Plan

The AIMP identifies BMPs that Benton Solar and its contractors will take to avoid, minimize, or mitigate potential adverse impacts to agriculture that may result from the construction, operation, and decommissioning of the Project (see Appendix C). These BMPs will include soil segregation and decompaction, measures to be implemented during wet weather conditions, and erosion and sediment controls. Upon decommissioning, Benton Solar will restore the Site to approximate preconstruction conditions to the maximum extent possible. Due to the implementation of BMPs, Benton Solar anticipates that the primary agricultural impact is that the land within the Preliminary Development Area will not be farmed for the life of the Project (25–30 years).

2.4.2 Vegetation Management Plan

Benton Solar has developed the VMP to guide Site preparation, vegetation establishment and management, undesirable species management, and erosion control (see Appendix D). The primary goals are to establish regionally appropriate vegetation that, to the extent practicable: 1) will not impede Project operation; 2) will minimize the presence of noxious weeds and reduce long-term maintenance and invasive species management efforts; 3) will help to control erosion and runoff; and 4) will increase ecological diversity and function. Vegetation management is designed to continue for 3 years and then transition into long-term maintenance (see Appendix D). Benton Solar partnered with the Bee & Butterfly Habitat Fund through the Solar Synergy program to develop specific regionally appropriate seed mixes for the Project.

When properly designed and installed, pollinator-friendly vegetation at solar sites can provide the following benefits:

- Food and habitat for insects, including butterflies, bees, and other insects that pollinate flowering forbs and some commercial agricultural crops;
- Food, cover, and nesting habitat for various mammal, bird, reptile, and amphibian species;
- A significant reduction in wind and surface water erosion;
- A significant reduction in the need to apply fertilizer, herbicide, and pesticide, resulting in improved water quality; and
- An increase in organic matter and in the water-holding capacity of soils, resulting in a higher quality of soils available for farming following decommissioning of the solar facility (MDNR 2020).

Solar operations coupled with regenerative land management practices can also aid in the natural ability of vegetation and soils to sequester carbon and reduce nitrogen pollution (Section 2.4.3).

2.4.3 Reduction of Nitrogen Pollution and Avoidance of Impacts to Sensitive Groundwater Resources

Crop production typically requires the input of nitrogen fertilizer into soils to increase crop production. Excess nitrogen can enter aquatic resources, resulting in elevated nitrate levels that can harm fish and other aquatic life and pollution of drinking water if it enters surface and groundwater resources. Approximately 75% of Minnesota's citizens rely on groundwater as their drinking supply (Minnesota Department of Agriculture [MDA] 2015).

A study conducted by the Minnesota Pollution Control Agency (MPCA), in collaboration with the University of Minnesota and the U.S. Geological Survey (USGS), determined that more than 70% of nitrates in the state's environment comes from cropland, with the remaining 30% coming from other sources such as wastewater treatment plants, septic and urban runoff, forests, and the atmosphere (MPCA 2013).

Minnesota state agencies and private organizations are researching strategies and developing tools to address nitrogen levels in the state. The state also has a rule in place to protect groundwater from pollutants, including nitrogen. The Groundwater Protection Rule (MDA 2019) minimizes potential sources of nitrate pollution to the state's groundwater and aims to protect drinking water. Under this rule, applying nitrogen fertilizer in the fall is restricted in areas that are vulnerable to contamination.

The Project will result in the conversion of up to 614.5 acres of primarily cultivated cropland to a vegetated landscape of regionally appropriate vegetation, which will not receive nitrogen applications for the life of the Project (see Section 2.4.2 and Appendix D). Consequently, the Project is expected to improve groundwater and surface water quality by eliminating nitrogen application and drainage that could potentially move excess nitrogen off the Site (Christianson et al. 2016).

2.5 Alternatives Considered but Not Pursued

According to Minn. Stat. § 216E.04, subd. 2(8 and 9), the Project qualifies for the alternative review process outlined in Minn. R. 7850.3100. Therefore, Benton Solar is not required to propose alternative Project sites. Multiple design and layout iterations have been previously considered, which largely resemble the Site and Preliminary Development Area presented herein. These alternatives were not pursued due to landowner restrictions and sensitive environmental and cultural resources discovered by Benton Solar during survey efforts. Benton Solar also considered a design that did not include a BESS and declined that alternative due to the benefits a BESS can provide to the Project and surrounding grid. As discussed in Section 2.3.1, the Site and Preliminary Development Area presented herein are the result of a detailed constraints analysis that considers: 1) optimal solar resource; 2) landowner support; 3) proximity to viable substations; and 4) environmental setting (a near level to gently rolling topography [Section 4.1] where impacts to sensitive environmental resources are minimized).

2.6 Cost Analysis

Capital costs are expected to range up to approximately $324,500,000 (Table 2.6-1). Final Project costs are dependent on several variables, including taxes, tariffs, construction costs, and solar panel selection. General costs associated with Project operation, maintenance, initial spare parts, operating equipment, and operating supplies will be approximately $1,540,000 in the first year and will average approximately $2,018,000 per year over the following 29 years.

Table 2.6-1. Estimated Project Installation Costs

Project Component	Total Cost
Development expenses	$3,800,000
Financing, engineering, construction, procurement	$318,000,000
Interconnection	$2,700,000
Total	**$324,500,000**

2.7 Future Expansion

The interconnection request for the Project is 100 MW, the same amount as the Project's nameplate capacity. Benton Solar is in the process of filing a surplus agreement with MISO for the BESS. The Project substation and transmission line (see Section 3.1.6) are being designed and developed to carry up to 200 MW to accommodate any potential future expansion of the Benton Solar Project or interconnection of an adjacent, separate project. Any such expansion or construction of a separate project, including additional infrastructure that may be required, will be addressed and permitted separately in the future.

3 ENGINEERING AND OPERATIONAL DESIGN

The Solar Facility portion of the Project will use solar panels to collect energy from the sun to produce direct current (DC) electrical power. Each row of panels will be connected in series to one another, becoming what is referred to as a string. A group of several strings will be connected and routed adjacent to the panels via DC cable that will be either aboveground in a hanging harness system or belowground in a filled trench. This DC cable will travel to a power conversion unit (PCU), which will house a DC/AC inverter and a transformer (together, a medium-voltage breaker) inside grounded, metal casing. Inverters will convert the 1,500-volt (V) DC power from the panels to 1,500-V AC power. Subsequently, the transformer will step up the power from 1,500 V to 34.5 kV (AC). A system of collection cables will then carry the generated power to the Project substation. The collection system will be located underground and will require the minimum number of splices and junction boxes needed to complete the run under the given site conditions and in consideration of cable reel limitations. Once delivered to the Project substation, the power will travel to a medium-voltage breaker, which will combine the feeds into the medium-voltage collection bus. The power will then go to the substation's step-up transformer that will convert the voltage from 34 kV to 115 kV, which is transmission voltage. From this step-up transformer, the power will travel through a high-voltage bus and additional substation electrical equipment necessary for protection and controls (in accordance with the Institute of Electrical and Electronics Engineers codes and National Electrical Safety Code) to a transmission line that will bring the power to the transmission owner's ring bus. From here, the transmission owner will send power to the grid.

The BESS portion of the Project will store power from the Solar Facility and/or the grid, allowing power to be distributed or collected at times when it is most advantageous. Individual battery cells form the core of the BESS. Battery cells are assembled either in series or parallel in sealed battery modules. Benton Solar will install battery modules in self-supporting racks that are electrically connected either in series or parallel. Individual self-supporting racks are then connected in series or parallel and terminated at a power conversion system (PCS). From the PCS, power will flow to the substation via medium-voltage cables that will be installed underground.

The following sections provide further details of the Project's primary Facilities.

3.1 Design

3.1.1 Photovoltaic Arrays

3.1.1.1 PANELS

The Project's solar arrays will use multiple PV panels fastened to an efficient tracking system. Multiple PV panels will be installed on each tracking rack. Tracking angles will fall between ± 52 degrees throughout the day and have a resting angle of 52 degrees (Images 3.1-1 and 3.1-2). The top edge of the PV panels on

the racking system could be up to 20.0 feet in height from the ground based on topography and manufacturer specifications. Depending on the manufacturer and technology selected, the PV panels may have silicon, aluminum frame, an undermount aluminum frame or side-mount weatherized plastic backing, heat-resistant front glass, and a laminated material encapsulating the panels for weather protection. The design will involve no spinning machinery, no thermal cycle, and no water use. To limit the amount of reflection, solar panels will use light-absorbing, dark materials that are smooth with anti-reflection coating. Using current technology, panels reflect as little as 2.0% of direct sunlight assuming use of anti-reflective coatings and the optimized angle of the sun. The Project will require 3,532 PV tracking systems containing approximately 260,208 PV panels. A specific PV panel has not yet been selected for the Project.

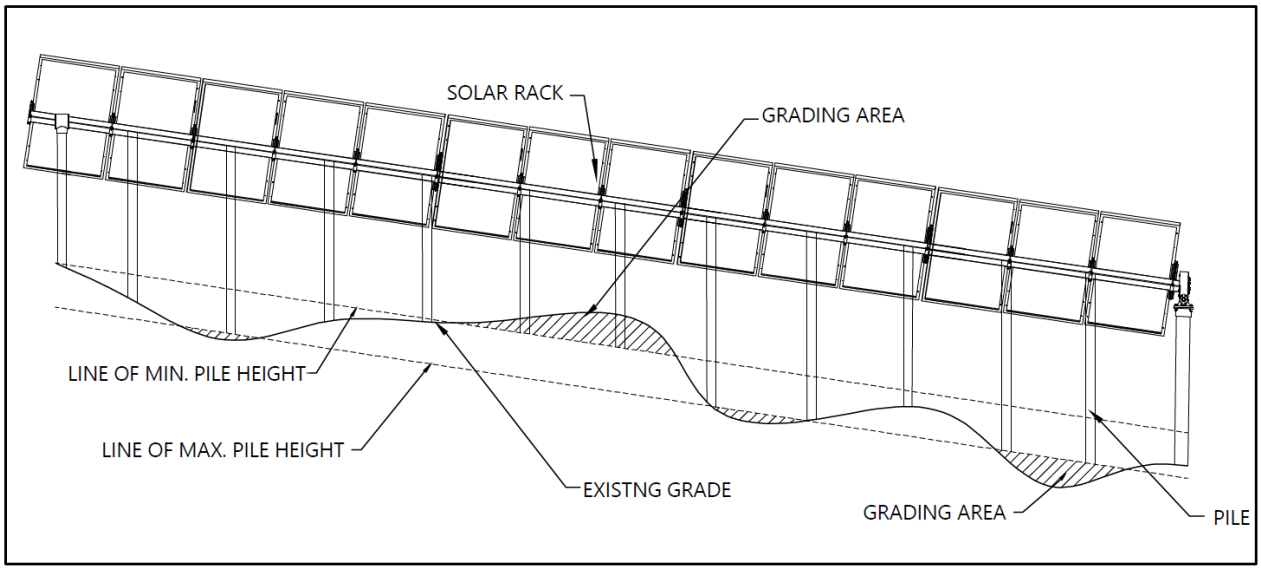

Image 3.1-1. Typical solar tracker grading profile.

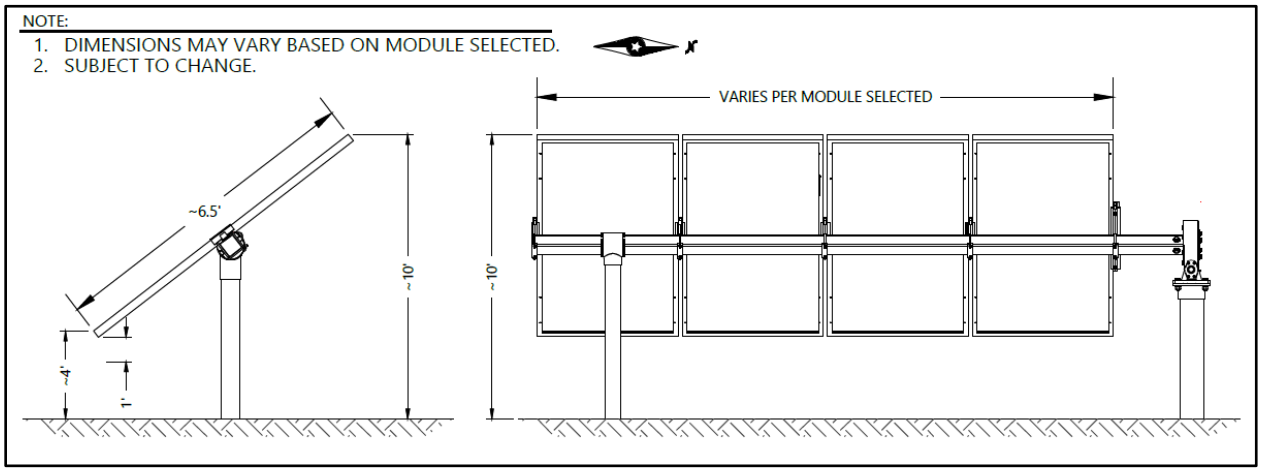

Image 3.1-2. Typical solar tracker profile view.

3.1.1.2 TRACKING SYSTEM

The tracking system consists of all the components involved in fastening the PV panels to the tracker rows, plus the tracker beams, gearboxes, motors, and foundations. To the extent practicable, the tracking system foundations will be driven steel piles not requiring concrete. Under certain Site conditions, concrete

foundations may be required. Based on the information known at the time of this Application, Benton Solar considers the need to install concrete foundations highly unlikely. The tracking system will move the panels incrementally throughout the day to track the sun from east to west.

3.1.1.3 POWER CONVERSION UNITS

Inverters, medium-voltage transformers, and air conditioning units will be contained within metal structures called PCUs (Image 3.1-3). The PV panels will be connected to each other in series to create a string. Multiple strings will be connected and routed to the PCU via DC electrical wiring. Inverters will convert the electrical power from DC to AC in order to transport the power more efficiently to the substation. After power is converted to AC at the inverter, it will be stepped up from low voltage (1,500 V) to medium voltage (34.5 kV) by a transformer housed adjacent to the inverter.

PCUs will be located throughout the Preliminary Development Area. The PCUs will be centralized within the array areas to maximize efficiency and minimize disturbance. The number of PCUs will be dependent on inverter, transformer, air conditioning unit, and solar panel specifications and availability. PCUs will be installed on concrete slabs or elevated pile foundations. Concrete foundations will be either precast or poured on-site (Image 3.1-4 and 3.1-5).

Image 3.1-3. Typical power conversion unit.

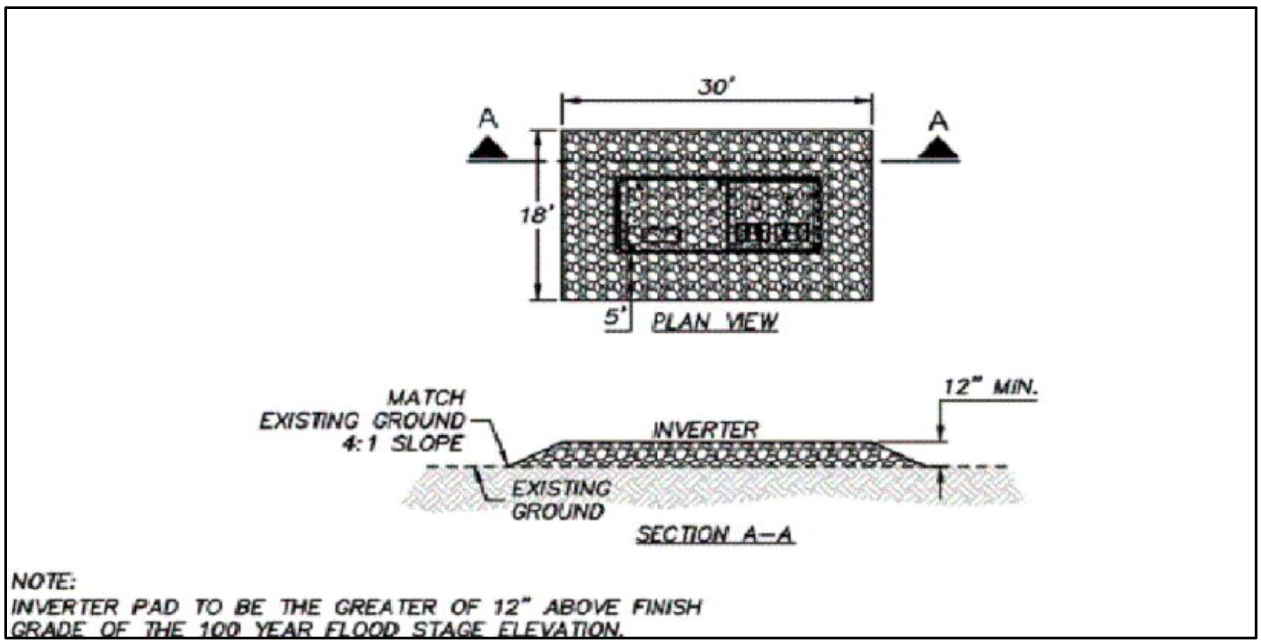

Image 3.1-4. Typical power conversion unit pad.

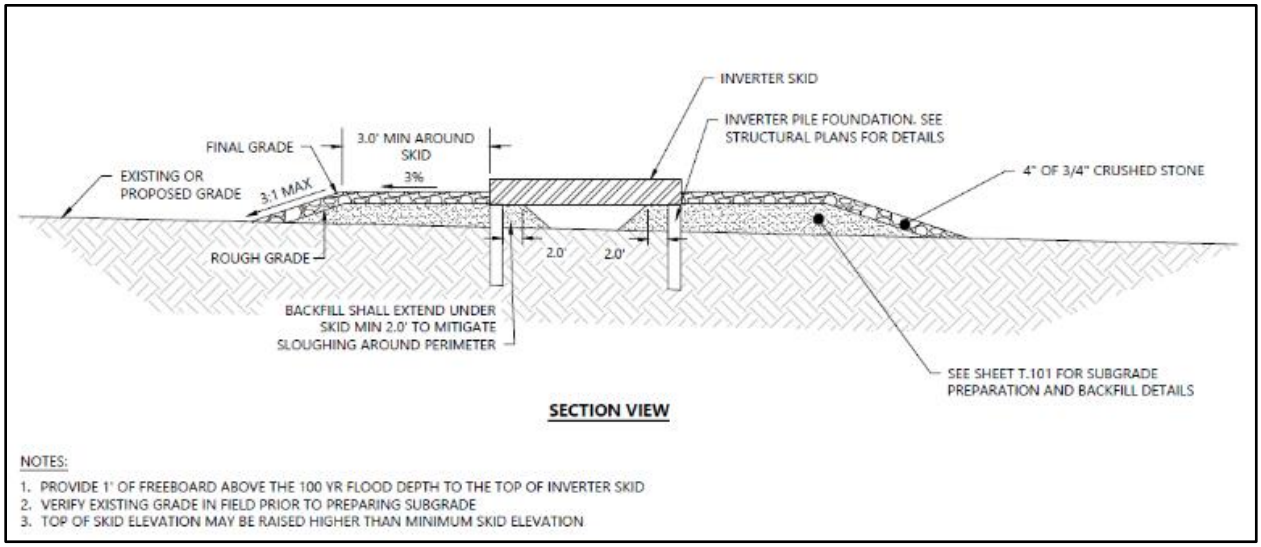

Image 3.1-5. Typical power conversion unit pad.

The power generated by the PV panels is transferred to the PCU via DC collector cables typically mounted underneath the panels using a hanging harness system. This system avoids unnecessary trenching and construction disturbance. Between the PCUs, and ending at the substation, the AC collection system will be located in subsurface trenches or bores (see Section 3.1.3). Trenching, plowing, boring, excavation, and grading activities will follow the Project AIMP and BMPs outlined in the Project stormwater pollution prevention plan (SWPPP) to minimize impacts to existing vegetation and topsoil (see Appendix C).

3.1.2 Battery Energy Storage System

3.1.2.1 BATTERIES

The BESS will store power from the solar array and/or the grid, allowing power to be distributed during times when it is most advantageous. The capacity of a BESS is based on its ability to provide its rated MWh capacity in a full battery charge or discharge. Benton Solar has designed a centralized, AC-coupled system (i.e., all batteries sited in one location as opposed to distributed throughout the Preliminary Development Area). The BESS will be contained on approximately 3.1 acres (Table 1-1). Compared to a distributed BESS system, a centralized system is more technologically developed; provides for more efficient access, monitoring, and maintenance; has more flexible energy and power capacity sizing; and has more flexible dispatch capabilities. The preliminary site plan incorporates a BESS with a modular layout based on currently available technology, which provides a conservative estimate of the size of the BESS.

Individual battery cells form the core of the BESS. Battery cells are assembled either in series or parallel in sealed battery modules. Benton Solar will install battery modules in self-supporting racks that are electrically connected either in series or parallel. Individual self-supporting racks are then connected in series or parallel to deliver the BESS power rating. Benton Solar has not finalized the battery type for the Project and will select the battery type based on the technology available at the time of construction.

3.1.2.2 ENERGY STORAGE SYSTEM CABINETS AND BATTERY MANAGEMENT SYSTEMS

Multiple self-contained energy storage system cabinets will house the batteries and the battery management systems (BMS) (Images 3.1-6, 3.1-7, and 3.1-8). The BMSs are used in conjunction with the site-wide programmable logic controller (PLC) to monitor battery voltage, current, temperature, charge, discharge, thermal management, fault diagnosis, and more. Together, the BMS and PLC are a multi-level control system designed to provide a hierarchical system of controls for the battery modules and PCS up to the point of connection with the substation. The BMS and PLC ensure that the BESS effectively responds to grid emergency conditions and provide a secondary safety system designed to safely shut down the BESS in the event of an emergency. The self-contained energy storage system cabinets also contain the required heating, ventilation, and air conditioning (HVAC) for operation. The height of an individual cabinet will not exceed 25 feet.

This non-occupiable, containerized design provides system segmentation and spatial separation of BESS components, which greatly reduces the risk of fire propagation and prevents people from becoming trapped inside if a fire does occur. Separate containers also allow isolation of conditions in the unlikely event of an incident (e.g., overheating, fire).

Image 3.1-6. Example self-contained energy storage system cabinet.

Image 3.1-7. Example self-contained energy storage system cabinet.

Image 3.1-8. Example self-contained energy storage system cabinet.

3.1.2.3 FIRE DETECTION SYSTEM

The BESS design will comply with the International Fire Code 2018 (IFC), National Fire Protection Association (NFPA) Standard 855 (NFPA 855), and the National Electric Code (NFPA 70). Benton Solar will require its selected suppliers to perform the UL 9540A Large Scale Fire Test, which is a "Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems." Benton Solar will procure equipment that has demonstrated, through a third-party nationally recognized testing laboratory, containment of a thermal runaway event (i.e., that the event will not spread from one battery rack to another). Such testing will allow Benton Solar and stakeholders to understand potential hazards posed by specific batteries, and to ensure that the appropriate safety features are incorporated based upon results, as required by NFPA 855 and IFC.

Benton Solar will incorporate fire detection systems into the BESS design in accordance with NFPA safety standards and codes applicable to stationary energy storage.

3.1.2.4 POWER CONVERSION SYSTEM

The PCS will be located in the BESS and consists of an inverter, transformer, protection equipment, DC and AC circuit breakers, filter equipment, equipment terminals, and a connection cabling system. Electric energy is transferred from the solar array and/or the grid to the batteries during a battery charging cycle and from the batteries to the grid and/or solar array during a battery discharge cycle. The PCS converts electric energy from AC to DC when energy is transferred from the grid to the battery and from DC to AC when energy is transferred from the battery to the grid and/or solar array. The energy conversion is enabled by a bidirectional inverter that connects the DC battery system to the AC electrical grid. The PCS will also include a transformer that converts the AC side output of the inverter to medium AC voltage to increase the overall efficiency of the BESS and to protect the PCS in the event of system electrical faults.

3.1.2.5 HEATING, VENTILATION, AND AIR CONDITIONING

Each self-contained energy storage system cabinet will be equipped with HVAC and liquid cooling or other thermal management systems for thermal management of batteries. Power for the thermal management systems will be provided through excess capacity in the batteries when charging and discharging, or via the grid when idle.

3.1.3 Electrical Collection System

Energy from the Solar Facility and BESS will be distributed through a series of underground cables that comprise the electrical collection system, which will deliver power to the collector substation. The power will be stepped up at the Project's collector substation from the collection line voltage of 34.5 kV to the transmission line voltage of 115 kV and will interconnect to the existing GRE Benton County Substation. The electrical collection system will meet the National Electrical Safety Code. The design work includes a load flow analysis for the Project to ensure that the Project will meet the power factor and voltage control specifications.

The electrical collection system will be direct buried cable. The underground cables will be installed via open trench or plowed, 3.0 to 4.0 feet deep. Collection cables may be installed via directional boring under certain features (e.g., roads, driveways, rivers) to minimize impacts. Figure 3 and Appendix B show the electrical collection system location at the time of this Application. Benton Solar will continue to work with participants in the Site to ensure that the most ideal routes are used, taking the most direct paths practicable and reducing impacts to the surrounding area. The electrical collection system routing may change pending final design.

3.1.4 Roads

Project construction will include approximately 7.6 miles of dirt or graveled access roads. Access road length will depend on selected equipment and final engineering. The majority of access roads will be 10.0 feet wide with a 5.0-foot shoulder on either side. Access roads may be wider along internal road intersections, curves, and turnarounds (Image 3.1-9). Two access roads, one leading to the substation and one to the BESS, will be 20.0 feet wide with a 2.0-foot shoulder on either side. Gated entrances to access roads will be locked.

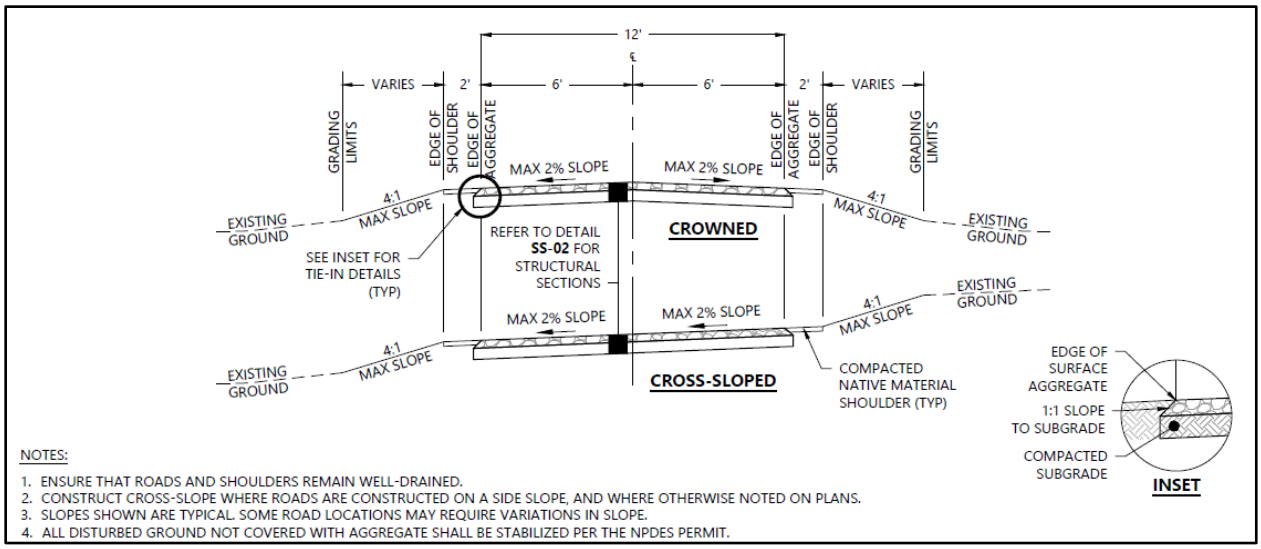

Image 3.1-9. Typical solar access road profile.

Upgrades or other changes to public roads may be needed for construction and O&M of the Project. Benton Solar will work with Benton County to coordinate and pay for required upgrades to meet the required public standards according to applicable road use agreements. Such upgrades may include, but are not limited to, additional aggregate, road improvements, and driveway/approach changes. Road improvements may require a repair and road use agreement with Benton County and/or Minden Township. Benton Solar will coordinate with all relevant entities as the Project develops. New driveways or changes to existing driveways will require an entrance permit from Benton County, which will be acquired before construction.

3.1.5 Fencing and Security Features

Benton Solar will install approximately 58,768.1 linear feet of permanent security fencing along the perimeter of the Preliminary Development Area, excluding minor portions of some Facilities (e.g., select access roads). The fence will be made of agricultural woven wire and will stand 8.0 feet above grade. Two strands of smooth, high tensile wire will be installed for a total height of 10.0 feet (MDNR 2023a). This perimeter fencing will prevent large wildlife species from entering the Preliminary Development Area. The fencing around the substation will include 1.0 foot of barbed wire on top of a 6.0-foot-above-grade chain-link fence to comply with the National Electric Code. The substation fencing system is designed to prevent the public from intruding and gaining access to electrical equipment, which could lead to serious injury. The BESS fencing will include 1.0 foot of barbed wire on top of a 7.0-foot-above-grade chain-link fence.

3.1.6 Substation and Transmission Line

The substation will be a 34.5/115-kV step-up substation with metering and switching equipment. The substation will be designed according to regional utility practices, including the MISO Standards (MISO 2023), Midwest Reliability Organization Standards (Midwest Reliability Organization 2023), National Electrical Safety Code (Institute of Electrical and Electronics Engineers 2023), and Rural Utilities Service Code (7 Code of Federal Regulations [CFR] 1728). The substation footprint will be graveled to minimize vegetation growth, reduce fire risk, and contain leaks or spills. The substation will be fenced with a 6.0-foot above-grade chain-link fence topped with 1.0 foot of barbed wire for security and safety purposes.

Benton Solar will construct, own, and operate a 115-kV transmission line to deliver energy from the Benton Solar Project to the electric grid. The transmission line will be constructed using primarily 115-kV single-circuit monopole structures and will be 0.5 mile long. The conductor type and exact length and position of the transmission line and poles will be determined during detailed electrical design. Proposed structure heights depend on terrain, span length, structure configuration, crossings, and other constraints. The proposed pole height is not expected to exceed 110.0 feet above the ground. The average pole height will be 45.0 to 95.0 feet above ground line. The transmission line is addressed in detail in Commission Docket IP7115/TL-23-425.

3.1.7 Operations and Maintenance Building and Supervisory Control and Data Acquisition System

An O&M building or dedicated space will serve as the center for Project O&M activities, provide Project storage, and provide network access to the SCADA system. The O&M building may also provide office space for crews and a shop/storage area for spare parts and vehicles. Benton Solar anticipates leasing an existing office space off-site for the O&M building.

The SCADA system will collect operation and performance data and allow remote operation of the Project. The Solar Facility and the BESS will be linked to a central computer in the control house in the substation and a remote operations center by an on-site fiber-optic network and off-site cellular, telephone, microwave, or satellite communications via a lattice microwave tower, or equivalent. The SCADA fiber-optic cables will be bundled with the electrical system. The SCADA system will interface with the transmission owner's communication network to allow the utility to monitor operations and to disable Project output in case of safety or grid-operation requirements. This monitoring system shows status views of mechanical and electrical data, fault and operation status, grid station data, and MET data.

3.1.8 Meteorological Evaluation Tower(s)

One temporary MET has been installed in the southwest corner of the Preliminary Development Area. The MET is used prior to construction to obtain more accurate data for sun exposure to support net capacity factor calculations as opposed to relying on standard assumptions. The tower is 7.0 feet in height. Once the Project is installed, one or more permanent METs will replace the temporary MET and be used to monitor incoming weather to inform O&M activities (e.g., properly storing panels in case of severe storms). The permanent METs will be connected to the SCADA system to collect data for analysis and system monitoring and will be 6.0 to 7.0 feet in height.

3.1.9 Stormwater Basins

Stormwater will be managed through installation of stormwater basins (see Figure 3). Benton Solar completed a detailed stormwater management study for the Project and designed the stormwater

management system in accordance with MPCA stormwater management for solar projects guidance and the National Pollution Discharge Elimination System construction stormwater permit program. Stormwater basins are strategically located to capture water without requiring additional grading to direct flow, reducing overall soil impacts. Final stormwater basin locations will be dependent on the final design.

3.1.10 Temporary Facilities

Benton Solar will construct and use several temporary laydown yards within the Preliminary Development Area, ranging in size from 0.1 to up to 2.0 acres and totaling approximately 6.6 acres. Temporary laydown yards will be used for parking, material storage, equipment storage, trailer storage, and delivery coordination during construction (see Figure 3).

3.2 Project Layout

The Project layout optimizes electrical output generation and efficiency while avoiding and minimizing impacts to environmental resources and existing infrastructure. The 631.9-acre Preliminary Development Area includes all Facilities (see Figure 3), with the exception of the O&M building that is anticipated to be located off-site. Table 1-1 provides the Facilities and their estimated acreages based on the Project's preliminary site plan. Final acreages may change pending final design. Some Facilities overlap and therefore share acreages in Table 1-1.

3.3 Setbacks

Site and route permits from the Commission supersede county requirements. However, Benton Solar will comply with the setback standard (i.e., 300.0 feet from any residential dwelling unit not located on the property) and visual screening (i.e., installed in some instances where there is less than 1,000 feet of separation between a residence and solar array) standards outlined in the Benton County Development Code, Section 9.20, Solar Energy Systems, where necessary (Benton County 2020).

3.4 Project Construction

Benton Solar will complete several activities to carry the Project through to commercial operation. Table 3.4-1 provides a preliminary list of activities necessary to develop the Project and the estimated timeframe for each, which is subject to change.

Table 3.4-1. Development Activities and Estimated Timeframes.

Activity	Estimated Timeframe
Preconstruction	
Topographic surveys	Qtr. 4 2022–Qtr 1 2026
Hydrology surveys	Qtr. 4 2022–Qtr 1 2026
Environmental surveys	Qtr. 2 2022–Qtr 2 2024
Title and boundary surveys	Qtr. 1 2024–Qtr 3 2024
Conduct geotechnical investigations	Qtr. 4 2022–Qtr 1 2026
Design Facilities and layout	Qtr. 4 2025–Qtr 1 2026
Complete underground utility discovery	Qtr. 1 2023–Qtr 4 2025

Activity	Estimated Timeframe
Procure necessary Facility components (e.g., solar panels, tracking system, transformers, batteries)	Qtr. 1 2023–Qtr 2 2027
Tree Clearing	Qtr. 3 2025–Qtr. 1 2026
Construction	
Conduct Site preparation, including grading, vegetation removal, and stabilization planting, if needed	Qtr. 2 2026–Qtr. 3 2026
Install stormwater treatment Facilities	Qtr. 2 2026–Qtr. 3 2026
Construct access roads	Qtr. 2 2026–Qtr. 3 2026
Construct laydown yards and set up temporary job trailers	Qtr. 2 2026–Qtr. 2 2026
Construct and install fencing	Qtr. 4 2026–Qtr. 3 2027
Install all Facilities	Qtr. 4 2026–Qtr. 3 2027
Postconstruction	
Test Facilities	Qtr. 2 2027–Qtr. 4 2027
Begin commercial operation	Qtr. 4 2027

Select activities are described further below.

3.4.1 Geotechnical Investigations and Tree Removal

Preconstruction geotechnical studies will be completed to determine topsoil and subsoil types and the mechanical properties of the soils. Consideration of soil properties informs Project design (e.g., solar array foundation system). For example, foundations typically are steel piles driven into the ground using a hydraulic ram that moves along tracks. The piles may be installed at predefined locations throughout the array area to an embedment depth of 8.0 to 14.0 feet below grade. The exact embedment depth depends on various factors, including soil properties.

Benton Solar has designed the preliminary site plan to maximize use of lands already disturbed (e.g., cropland). Prior to construction, Benton Solar will remove up to approximately 10.1 acres of forested land cover within the Site to accommodate construction of the Project substation, to establish HDD boring entry points and access to those entry points, and to address shading concerns. In most areas, forest remnants have been avoided (see Figure 3).

3.4.2 Construction

Construction begins after acquiring all necessary permits, execution of the GIA, and following Issue for Construction design drawings. Construction (i.e., the period beginning with start of earth-moving through mechanical completion) is expected to take approximately 14 months, which includes a 16-week winter window during which construction is expected to be scaled back substantially (winter break).

The majority of construction activities will take place during the summer and fall. During construction, the total number of employees on-site per day is likely to average 150 employees, which may increase to 300 employees during the peak of construction. Local workers will be used to the extent possible. Nonlocal workers may be hired when local workers are not available. Personnel will include preconstruction survey crews, utility workers for local power stations, supervisors, and engineers.

During construction, equipment and work vehicles will travel to and from the Site. The daily construction workday is anticipated to be consistent throughout the construction season when most of the access road

construction, electrical, and substation work is taking place. Typical construction equipment such as scrapers, dozers, dump trucks, watering trucks, motor graders, vibratory compactors and pile drivers, pickup trucks, backhoes, concrete trucks and pumpers, boom trucks, tractor trailers, and large cranes will be used during construction. Personnel will prevent the spread of dust during operations by moistening surfaces with water and/or commercial dust suppressants as needed to reduce the risk of dust becoming a nuisance to the public and neighbors. Water will be utilized for dust mitigation within the Site. To the extent practicable, vehicular traffic will be limited to permanent and temporary access roads to minimize soil disturbance, mixing, and compaction. However, traffic may occur off roads throughout the Project during construction. Vehicles traveling overland may include small all-terrain vehicles and pickup trucks for transporting equipment and workers throughout the Site.

3.4.2.1 SITE PREPARATION

Construction will begin with Site preparation, including grading. Grading will occur only in areas where the elevation requires alteration to accommodate tracker tolerances, drainage, roads, laydown yards, and foundations. This minimal grading approach helps preserve underground root structure, topsoil nutrients, seed base, and preconstruction Site hydrology. Areas that will be graded will have topsoil stripped, stockpiled, and labeled, as practicable, to avoid mishandling or mixing with subsoil horizons in accordance with the Project's AIMP (Appendix C) and VMP (Appendix D). If needed, excavated subsoil will be windrowed adjacent to excavation in areas where topsoil has been salvaged. In these situations, subsoil will be returned to the excavation with no disturbance to topsoil as practicable (i.e., topsoil should be salvaged prior to subsoils excavation and segregated appropriately). Covering the topsoil with a thin layer of straw mulch to act as a buffer between the subsoil and topsoil may be used as necessary to facilitate a more effective separation of the subsoil and underlying topsoil. Grading, including erosion control and soil stabilization measures, will be performed in compliance with the Project SWPPP.

Existing vegetation will be preserved to the maximum extent possible, though all areas within the Preliminary Development Area will be mowed or grubbed as needed to prepare the Site for construction. Organic matter that remains after mowing will remain in the construction area except in trenches and under equipment foundations. If site preparation and final grading is completed in spring and allows for permanent seeding prior to June 30, Benton Solar may opt to install seed mixes in all disturbed areas prior to installation of the Facilities. If site preparation and final grading are not completed prior to June 30, or if Benton Solar opts not to install seed prior to installation of Facilities, then disturbed areas will be seeded with a temporary cover crop following final grading to stabilize soils and prevent erosion during construction. In this case, the vegetation manager would install a permanent seed mix in late fall or during the following spring (if Facility installation is not completed prior to soil freezing in fall). For additional details on revegetation following site preparation, refer to the VMP (see Appendix D).

3.4.2.2 ACCESS ROADS AND LAYDOWN YARDS

Permanent access roads and turnouts will be developed during initial construction phases. This work starts with stripping and segregating topsoil materials from the road width. Once the subgrade materials are compacted to specified requirements, the road will be installed as designed, with or without geo-fabric depending on soil type, and may be surfaced with gravel. After roads are installed and compacted to engineers' requirements, the Project drainage ditches will be shaped as identified on the final grading plan. The previously stripped and windrowed topsoil material will be respread throughout the Site.

Additionally, Benton Solar will establish several temporary laydown yards on a total of 6.6 acres. Laydown yards will be installed following the methods described above for access roads and turnouts.

3.4.2.3 PHOTOVOLTAIC ARRAYS

After grading and installation of permanent access roads and turnouts, Benton Solar will construct the PV arrays and install the electrical collection lines within the solar field. The Project will be constructed in blocks, and multiple blocks will be constructed simultaneously.

The tracking rack systems will be constructed by pre-positioning and driving piles, mounting the tracking rack system to the piles, pre-positioning panel pallets for distribution to workspaces, mounting panels to the tracking rack system, completing electrical connections, completing terminations and grounding, and installing cabling systems. Foundations are typically galvanized steel and used where high load-bearing capacity is required. In situations where soils are low strength, helical screw or auger-type foundation posts may be used. The piles will be driven using a hydraulic ram that moves along tracks and is operated by workers. The remainder of the tracking rack system, including solar panels, will be installed by construction crews using hand tools and pickup trucks or all-terrain tracked vehicles to distribute materials to work areas. Array racking will be bolted on top of foundation piling to create a "rack" to which solar panels are fastened. Installation crews will proceed in serpentine fashion along staked temporary access roads in a pre-established route to minimize off-road traffic.

3.4.2.4 SUBSTATION

Grading for the substation foundation and future access roads will be completed during Site preparation and according to the Project design.

Substation construction will include installation of substructures, electrical equipment, and concrete foundations and equipment embedments. The grounding grid and underground conduit will be installed in conjunction with foundations for the transformer, control housing, and high-voltage structures. Secondary containment areas for the transformer will be constructed as necessary, and final grading will occur around the substation.

The final activities associated with the substation construction include stringing electrical wires; installing perimeter fencing; and placing coarse, clear crushed rock throughout the fenced interior. Lighting will be installed around the substation for worker safety during construction and operation.

3.4.2.5 BATTERY ENERGY STORAGE SYSTEM

Benton Solar will construct the BESS either concurrently or subsequent to the construction of the PV arrays and substation. After grading, Benton Solar will install underground cabling, followed by applicable temporary and permanent Facilities. The BESS will include those Facilities described in Section 3.1.2.

3.4.2.6 EQUIPMENT TESTING

Project equipment inspections will follow Project requirements. During and after construction, personnel will calibrate and test systems, controls, and safety equipment before putting equipment into service. Additionally, the communication, MET, collection, and SCADA system components will be tested, inspected, and commissioned.

3.4.3 Construction Management

Benton Solar will employ a construction manager based at the Site whose responsibilities will include scheduling and coordinating the activities of engineering, procurement, and construction contractors. Individuals specializing in engineering, permitting, meteorology, environmental compliance, real estate,

and geographic information systems (GIS) mapping will support the on-site construction manager. Throughout construction, the Project's development, design, and construction teams will coordinate routinely to execute work. This coordination includes safety and quality control programs, cost and schedule forecasting, Site security, and communication with local officials, citizen groups, and landowners.

3.4.4 Emergency Action Plan

Benton Solar will work with local responders to develop and implement an Emergency Action Plan (EAP) to be provided to Benton County and to all Project personnel prior to initiating construction. The EAP will establish actions to be taken by the personnel responsible for construction in the event of an emergency. The following topics will be discussed in the EAP:

- Document records
- Safety protocols
- State and federal compliance
- Emergency contacts
- Training and annual drills
- Information for first responders, including minimum approach distances for first responders and requirements for self-contained breathing apparatus or other personal protective equipment
- General emergency event procedures
- Natural disaster and severe weather
- Fire response
- Physical and cyber security
- Environmental
- Immediate or delayed site evacuation
- Designated evacuation egress routes and muster areas
- Personnel injuries and serious health conditions

Safety and training programs will also be described in the EAP because they are critical assets for managing emergency conditions. Personnel that respond to emergency events will have all required qualifications (e.g., electrical) up to date and will keep safety top of mind. Benton Solar is committed to providing a safe and healthy work environment for all employees and requires that safety should not be compromised for any other business priority.

3.4.5 Commissioning

Benton Solar will inspect equipment prior to commercial operation of the Project. Benton Solar will inspect and test each component of the solar array and associated communication, MET, collection, BESS, and SCADA systems. Testing, inspections, and commissioning will occur during and following completion of construction.

3.4.6 Restoration

Following construction, areas that will not contain permanent Facilities (e.g., areas below solar panels) will be stabilized and revegetated in accordance with the Project SWPPP and VMP (see Appendix D). Benton

Solar developed its VMP to guide Site preparation, vegetation establishment and management, undesirable species management, and erosion control. Restoration efforts in designated areas include reseeding with regionally appropriate seed mixes developed in collaboration with the Bee & Butterfly Habitat Fund.

3.5 Operations and Maintenance Activities

The construction manager will coordinate with operations staff, equipment suppliers, and other construction and maintenance personnel to ensure a smooth transition from the start of construction to the commercial operation date of the Project. Operations staff will be responsible for ensuring that O&M is conducted in compliance with approved permits, prudent industry practices, and equipment manufacturers' specifications. BESS O&M activities will be coordinated with those for the Solar Facility. Qualified technicians, mechanical professionals, and electricians will test and inspect all Project components (e.g., transformers, communications systems, switchgear systems, batteries, and interconnection systems) to ensure that they meet required specifications and are working properly.

Benton Solar anticipates two to three full-time employees to operate and maintain the Facilities. Most operation functions will be operated through a SCADA system (Section 3.1.7). Scheduled maintenance activities are provided in Section 3.5.3, Table 3.5-1.

The expected service life of the Project is 25 to 30 years based on the useful commercial lifespan of panels. A maintenance plan, which will include a predictive maintenance approach for devices subjected to derating/degradation, will be created to ensure Project performance of the Facilities. Derating/degradation is the process of components losing efficiency or otherwise degrading over the course of the Project's life cycle. The main scheduled activities are described in more detail in Table 3.5-1. Maintenance activities will be scheduled to minimize loss of power production as much as possible. Maintenance activities that could temporarily increase noise levels will be performed during the day to minimize impacts to nearby residents. The Project is designed to minimize unscheduled maintenance. For example, if a module needs to be replaced, that particular section of the Project's array can be isolated for repair. A temporary shutdown will result in only a minimal loss of energy production during that time. Additionally, the power production circuits operate separately from the tracking circuits, which allows the PV panels to generate power during a tracking system outage.

3.5.1 Supervisory Control and Data Acquisition System

Benton Solar will conduct regular performance monitoring of the SCADA system data (e.g., produced energy, alarms, faults), including regular downloads and data backups. Both the PV arrays and BESS will communicate directly with the SCADA system.

3.5.2 Equipment Inspection

Inspection of Project equipment will include: 1) visual checks of PV modules, tracking systems, and the surrounding area to verify the integrity of the panels and tracking structure; 2) visual checks of wildlife and nest presence; 3) visual checks of inverters, transformers, and electrical panels and their connection equipment and grounding network; 4) electrical checks of main switches and safety devices; 5) checks of abnormal noises; 6) visual checks of electrical lines and the connection box; 7) visual inspections of the transmission line and structures; 8) visual inspections of the substation; 9) inspection and cleaning of BESS air filters; and 10) checks of the BESS HVAC systems. Regular inspections will occur throughout the operational life of the Project. Table 3.5-1 provides a description and frequency of the O&M tasks.

3.5.3 Facility Maintenance and Frequency

Facility maintenance of the Project will include, but is not limited to, access roads, vegetation, fencing, and gates. Information on vegetation management is provided in the VMP in Appendix D. No PV panel washing is expected due to frequent naturally occurring precipitation events.

Table 3.5-1 provides information regarding the frequency of O&M tasks associated with the Project. The table shows the anticipated frequency of these tasks. However, inspection frequency may be altered based on the performance of certain Facilities and their components and the demands of the Facility.

3.6 Decommissioning and Repowering

At the end of the permitted period, Benton Solar may either extend and continue Project operations or decommission the Project. If extending the Project, Benton Solar will apply for a Site Permit extension. If Project operations continue, either existing equipment will be used or equipment will be upgraded with newer technologies. A detailed decommissioning plan is provided in Appendix E.

Benton Solar does not anticipate that the Project will be decommissioned sooner than the anticipated Project life (25–30 years). However, decommissioning schedule updates will be provided with updates to the Project decommissioning plan (see Appendix E). Benton Solar will update the plan every 5 years during Project operations. Decommissioning will be triggered at the end of the permitted period if a Site Permit extension is not requested/received, if the Project does not generate electricity for a period of 12 consecutive months, or if substantial action on construction of the Project is discontinued for a period of 12 consecutive months.

3.6.1 Timeline

Decommissioning is estimated to take 5 to 9 months to complete depending on conditions such as seasonality and weather.

Table 3.5-1. Operations and Maintenance Tasks and Frequency

Associated Facilities	Task	Frequency
Solar Facility		
	Performance verification using SCADA	Daily
Photovoltaic field	PV panels visual check	Once yearly
	Wirings and junction boxes visual check	Once yearly
	PV strings measurement of the insulation	Once yearly
	PV strings and string boxes faults	Once yearly
	Vegetative management	Dependent on Site conditions; estimated twice per year, plus weed control
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

Associated Facilities	Task	Frequency
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
	Torque check	Once yearly
Support structures	Visual check	Once yearly
	PV panels torque check on random sample	Once yearly
BESS		
	Performance verification using SCADA	Daily
	Inspection/cleaning of air filters	Monthly
	HVAC systems check	Monthly
Substation		
	Visual inspection	Once yearly

3.6.2 Removal and Disposal of Project Components

At the end of the Project's useful life, all Facilities will be removed as described below. Disposal of Facilities will meet the provisions of applicable state and local waste requirements.

- **Solar panels:** Solar panels will be inspected and tested prior to being disconnected and removed from racking. Operable panels will be packed and shipped to an off-site facility for reuse or resale. Nonworking panels will be packed and shipped for recycling or disposal at an appropriate facility. Benton Solar will assess resale options when the decommissioning plan is updated.
- **Racking:** Racking components will be disassembled and removed from steel foundation posts, sorted by size, and sent to a metal recycling facility.
- **Steel foundation posts:** Steel foundation posts will be pulled out to full depth, removed, processed to an appropriate size, and sent to a recycling facility.
- **Cables and lines:** Benton Solar will remove all buried cables, with the exception of select boring locations (e.g., beneath the Elk River). Cables and lines will be recycled or disposed of at an appropriate facility.
- **Inverters, transformers, and ancillary equipment:** All electrical equipment will be disconnected and disassembled, and all parts will be removed. The equipment will then be subject to one of the following actions: reconditioning and reuse, sold as scrap, recycled, or disposed of at an appropriate facility.
- **Foundation posts or piles:** Foundation posts or piles will be removed completely, with the exception of substation deep foundations that will be removed up to a depth of 4.0 feet (see below). Duct banks will be excavated to a depth sufficient to remove all materials (e.g., conduits, cables). All materials will be disconnected and disassembled, and all parts will be removed. The foundation posts or piles will then be subject to one of the following actions: reconditioning and reuse, sold as scrap, recycled, or disposed of at an appropriate facility.

- **Concrete slab foundations:** Concrete slabs used as equipment pads will be broken up and removed. Clean concrete will be crushed and disposed of off-site or recycled and reused on- or off-site if requested by the landowner.
- **Fences:** All fence parts, including foundations, will be disconnected and disassembled, and all parts will be removed. The fence parts will then be subject to one of the following actions: reconditioning and reuse, sold as scrap, recycled, or disposed of at an appropriate facility.
- **Access roads:** Gravel access roads will be stripped. Compacted soils may require ripping to loosen before revegetation. Foreign road materials will be removed and reused or disposed of in accordance with local regulations. Roads would be restored so that they become a part of the natural surroundings and are no longer recognizable, to the greatest extent practicable, as needed or as agreed upon in landowner lease agreements. Road gravel would be used to backfill foundation locations to within 6.0 inches of final grade. Access roads will be left in place if the landowner desires, at which time the landowner will have responsibility for the access roads. All remaining access roads will conform to applicable Benton County regulations in effect at the time of decommissioning.
- **Substation:** All framing, fencing, foundations up to a depth of 4.0 feet, and electrical equipment such as conductors, switchgear, and transformers, will be removed, disassembled, and recycled or reused off-site. The aggregate base will be removed and recycled or disposed of at a designated off-site location.
- **Stormwater treatment facilities (e.g., basins):** Benton Solar will grade stormwater basins to match surrounding contours, decompact soils, and spread topsoil to accommodate agricultural activities.
- **O&M building:** The O&M building will be removed from the existing office space and contents will be reused or disposed of appropriately.
- **BESS:** The BESS containers will be disconnected from electric ports prior to removal. Batteries will be prepared, packaged, and transported to a recycling facility. Energy storage system cabinets will be resold, reused, or recycled. Gravel will be removed and reused or disposed of in accordance with local regulations.

During removal of Facilities, Benton Solar will evaluate and categorize components and materials into reconditioning, salvage, recycling, and disposal categories. Specific disposal of all Facilities is described in detail in the Project decommissioning plan (see Appendix E).

3.6.3 Restoration and Reclamation

Benton Solar will restore the Site to approximate preconstruction conditions to the extent possible in coordination with landowners. Landowners may require the Site be returned to agricultural production or may retain restored vegetation or other land uses as agreed between the landowner and Benton Solar. As of the time of preparation of this Application, Benton Solar anticipates that the majority of the Site will be restored to a farmable condition or seeded with a seed mix approved by the local soil and water conservation district or similar agency. The goal of restoration will be to restore natural hydrology, soil conditions, and plant communities to the greatest extent practicable. The restoration effort will implement BMPs to minimize adverse impacts, which may include the following:

- Minimize new disturbance and removal of native vegetation to the greatest extent practicable.
- Remove equipment and access roads, backfill with subgrade material and cover with suitable topsoil to allow adequate root penetration for plants and so that subsurface structures do not substantially disrupt ground water movements.

- Stabilize soils and return to agricultural use if needed and according to the landowner direction.
- During and after decommissioning activities, install erosion and sediment control measures such as silt fences, bio-rolls, and ditch checks in all disturbed areas where potential for erosion and sediment transport exists, consistent with BMPs. Benton Solar may also use measures such as leveling, terracing, and mulching to prevent soil erosion and support establishment of target vegetation.
- During decommissioning activities, remove and stockpile topsoil as well as designate and separate from other excavated material, in accordance with the Project's AIMP. Prior to Site restoration, topsoil will be decompacted to match characteristics of the surrounding area. Benton Solar will replace topsoil to its original depth and original surface contours to the extent practicable. Benton Solar will mitigate topsoil deficiencies and settling using imported topsoil consistent with the characteristics and quality of soils in the Site, if necessary.
- Remediate any petroleum product leaks and chemical releases prior to completion of decommissioning.

3.6.4 Post-restoration Monitoring

The Project's National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater General Permit, SWPPP, and/or other applicable permits and approvals may require post-restoration monitoring. If monitoring is required, Benton Solar will utilize a third-party environmental monitor to observe earth-moving and trenching activities, identify any decommissioning- or restoration-related issues impacting on-site and/or off-site areas, and recommend corrective actions, if any, to prevent/mitigate unanticipated on-site and/or off-site impacts. The environmental monitor will be responsible for communicating any environmental concerns and potential issues to Benton Solar, Benton Solar's contractors, affected landowners, and other relevant stakeholders in a timely manner. Benton Solar will use discretion to either implement corrective actions or stop work, pending additional coordination. Benton Solar's environmental monitor will stay in routine contact with affected landowners and will conduct on-site check-ins until the National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater General Permit is closed.

3.6.5 Financial Assurance Plan

Benton Solar will be financially responsible for Project decommissioning. Benton Solar will work with Benton County to identify, agree upon, and provide a means of financial surety (e.g., bond, letter of credit, escrow, or similar instrument) that makes Benton County the beneficiary should Benton Solar be unable to fulfill its decommissioning responsibilities and establishes that financial assurances will be paid in full no later than the end of the term of the Power Purchase Agreement (see Appendix E).

The estimated cost to decommission the Project and restore the Site is a surplus of $1,229,700 in present-day dollars (see Appendix E). This total was determined by subtracting the estimated salvage revenue of $14,440,284 from the estimated decommissioning and Site restoration cost of $13,210,665. This estimated net surplus offers further financial assurance. The estimate was prepared using best available information from credible industry sources. The reclamation cost estimate will be re-evaluated every 5 years.

3.6.6 Repowering

Less expensive and more efficient solar modules may become available during the life of the Project, and repowering may be a potential option. Aging or faulty equipment, increasing maintenance costs, extending life, or increasing generation may also warrant repowering. Benton Solar expects to continuously evaluate

these options and potential reasons for Project repowering to determine if such investments would be worthwhile. In the event of repowering of the Project, Benton Solar will abide by applicable local, state, and federal regulations.

4 ENVIRONMENTAL INFORMATION

The following sections describe the existing environment at the time of the submission of this Application. Additionally, these sections describe anticipated impacts to the existing environment from construction and operation of the Project; irreversible changes anticipated to remain beyond decommissioning of the Project; and avoidance, minimization, and mitigation measures that would be implemented for the Project.

4.1 Environmental Setting

The Site is located 4.0 miles east of St. Cloud, Minnesota, in a rural setting. Residences and small businesses are scattered throughout this rural area, and land use is primarily agricultural (Section 4.2.10). The Site is generally bounded to the north by CH 50 (30th Street NE); to the east by CH 25 (75th Avenue NE); to the south by 2nd Street SE; and to the west by 55th Avenue NE. SH 95 intersects the Site near its center, and several local county and township roads also occur within the Site.

The Site lies within the Mille Lacs Uplands Subsection Ecological Classification System (ECS) 212Kb and the Anoka Sand Plain Subsection ECS 222Mc (MDNR 2023b) (Figure 5).

ECS 212Kb is in the Western Superior Uplands Section in the Laurentian Mixed Forest Province. ECS 212Kb consists of gently rolling till plains and drumlin fields of the Superior Lobe ground moraines and end moraine in east-central Minnesota. Parent material consists of brown and red till and bedrock consists of Middle to Late Archean and Early Proterozoic gneiss, amphibolite, undifferentiated granite, and metamorphosed mafic. Cretaceous marine shale, sandstone, and variegated shale are present at the southeastern edge of ECS 212Kb. Soils are loams, sandy loams, silt loams, and loamy sands. Pre-settlement vegetation consisted of a mosaic of forest types. Current vegetation and land use in the western and southern portions of ECS 212Kb include cropland and agriculture. Forestry and recreation are prevalent land uses in the central and eastern portions. Fire and windthrow were important natural disturbances in ECS 212Kb. Dense basal till is present at depths of 20 to 40 inches in ECS 212Kb and rooting depths for trees are shallow; windthrow is a common occurrence (MDNR 2023b).

ECS 222Mc is in the Minnesota and Northeast Iowa Morainal Section in the Eastern Broadleaf Forest Province. ECS 222Mc consists of flat, sand lake plains and terraces occurring along the Mississippi River. Low moraines are locally exposed, small dune features and ice block depressions are present, and southwest trending tunnel valleys occur on the sand plain. Bedrock is locally exposed in the St. Cloud area with surface glacial deposits usually less than 200.0 feet thick and underlain by Cambrian and Ordovician dolomite, sandstone, and shale. Soils are derived primarily from fine sands of the sandy plain. Pre-settlement vegetation predominantly consisted of oak barrens and openings on droughty uplands and sandplain brushlands. Additionally, upland prairie and floodplain forest was found in a narrow band along the Mississippi River. Current vegetation and land use in the drained peat and muck areas consist of sod and vegetable crops; in the sandplain, species associated with oak openings and barrens are present. Fire and drought were important natural disturbances and directly impacted vegetation of the sandplain (MDNR 2023b).

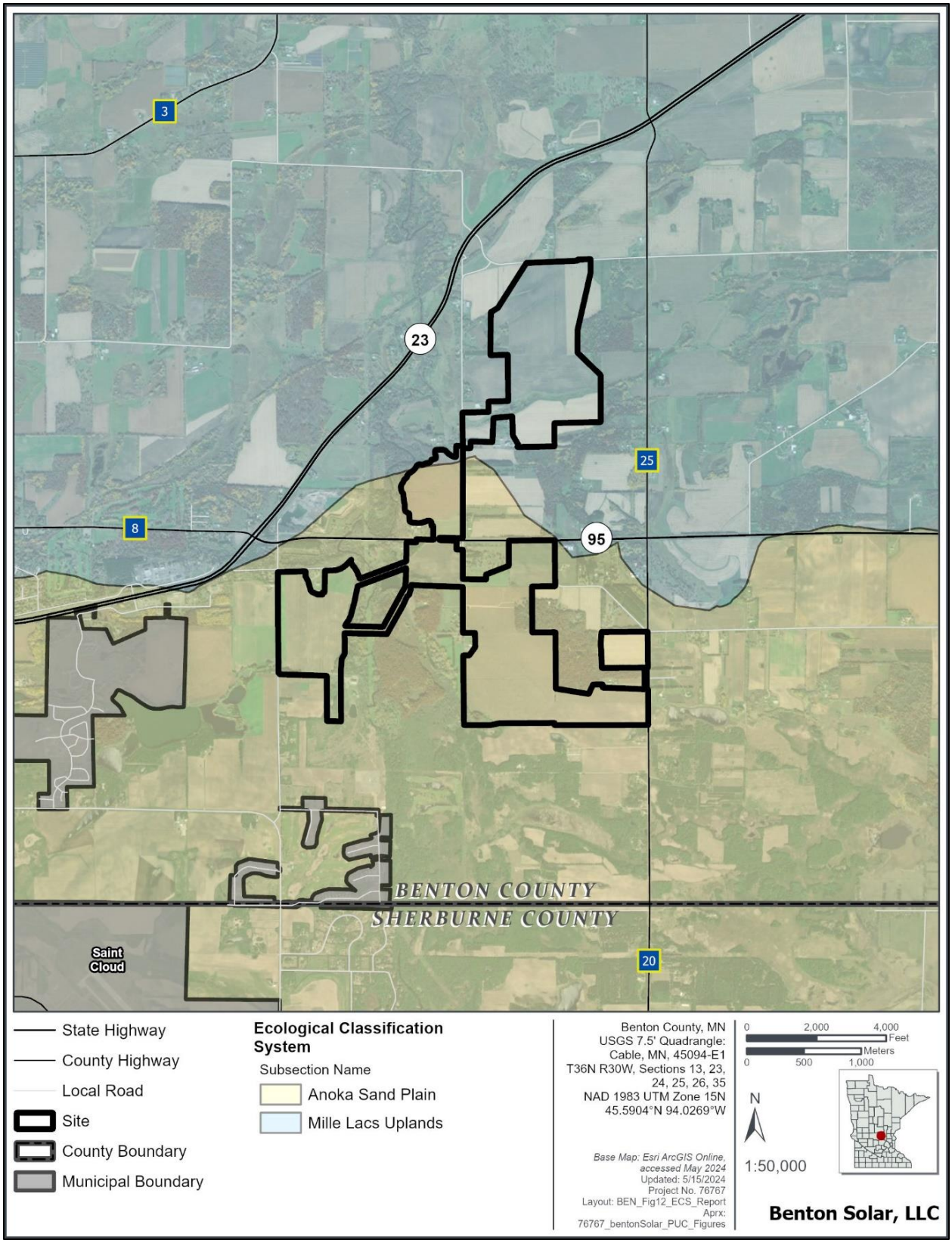

Figure 5. Ecological Classification System subsections.

Hydrology mainly consists of a well-developed drainage network. Pre-settlement vegetation mainly consisted of bur oak savanna. However, tallgrass prairie and maple-basswood forest areas were also common. Current vegetation and land use predominantly consist of farmland. Fire was a common historical, natural disturbance. However, land use changes through conversion of prairies and wetlands to agriculture, and development of rural roads and farmsteads resulted in fire suppression such that wildfires are now rare to nonexistent. Other natural disturbances include tornadoes, high wind events, and periodic flooding in river and stream valleys (MDNR 2023b).

4.2 Human Settlement

The following sections describe the potential impacts to human settlements from construction and operation of the Project. These potential impacts include public health and safety issues, electric and magnetic field (EMF) impacts, displacement of homes or businesses, introduction of new noise sources, aesthetics and socioeconomics impacts, local land use and zoning compatibility issues, and public services impacts.

4.2.1 Public Health and Safety

4.2.1.1 EXISTING CONDITIONS

If an emergency were to occur during Project construction or operation, multiple emergency services would be able to respond. These emergency services are located in St. Cloud, Minnesota, 4.0 miles west of the Site. Depending on the type of emergency, emergency service first responders include, but are not limited to, the Benton County Sheriff, St. Cloud fire department, Foley fire department, Sauk Rapids police department, and the St. Cloud Hospital ambulance.

The Allied Radio Matrix for Emergency Response (ARMER) is Minnesota's primary two-way 700- to 800-megahertz trucked public safety radio system. The ARMER radio system is open to all public safety entities in the state, such as law enforcement, fire service, and emergency medical services, as well as city, county, state, federal, and tribal governments (Minnesota Department of Health [MDH] 2018). The ARMER radio system's basic infrastructure consists of towers, repeaters, and microwave link equipment and transmits signals from one tower, in a line-of-sight mode, to another tower. Transmitted signals could be interrupted if the line-of-sight between ARMER towers is obstructed. According to the MDH, three towers are located in the Benton County ARMER (MDH 2018) in Gilman, St. Cloud, and Duelm. The closest ARMER tower location is in Duelm, 3.5 miles east of the Site. No ARMER towers are located in or within 1.0 mile of the Site.

4.2.1.2 IMPACTS AND MITIGATION

During construction or O&M activities, there could be a short-term increase in demand on emergency services in the discrete event that Benton Solar personnel are injured or require assistance in the event of an accident. However, the likelihood of such an event occurring is considered low. Benton Solar and its contractors will follow established industry safety procedures during and following construction, and during all O&M activities, including the use of signage and fencing to demarcate construction areas and to prevent public access. Benton Solar will also develop a safety plan for construction and O&M personnel that can be shared with agency response teams, as needed. The safety plan will describe standard procedures to be followed in accordance with local, state, and federal regulations and standard safety practices, and will include contacts for first responders and construction and O&M personnel. The safety plan will also include emergency procedures in the event of evacuation, fire, extreme weather conditions, injury, and criminal activity.

Due to the establishment and implementation of safety protocols, Benton Solar anticipates that the likelihood of any impacts (e.g., discrete, increased demands on emergency services) to occur as a result of the Project is low.

The closest ARMER tower location is 3.5 miles east of the Site. Facilities are anticipated to be below the ARMER tower typical height and below the top of the tower's line-of-sight. Therefore, no impacts to the ARMER radio system are anticipated.

4.2.2 Displacement

4.2.2.1 EXISTING CONDITIONS

There are 287 residences that occur within 1.0 mile of the Site. There are no residences within the Site. The distance from a solar panel to the nearest residence is 314.7 feet. Further information on residences is found in Section 4.2.5 and Appendix F.

4.2.2.2 IMPACTS AND MITIGATION

No residences occur within the Site, and no residences or structures will be moved as a result of the Project. Therefore, the Project will not cause displacement and no mitigation measures are proposed.

4.2.3 Noise

4.2.3.1 EXISTING CONDITIONS

Noise is measured on a logarithmic scale in units of decibels. Human hearing is not equally sensitive to all frequencies of sound. Therefore, certain frequencies are given more "weight." The A-weighted decibel scale (dBA) is used to reflect the selective sensitivity of human hearing. It puts more weight on the range of frequencies that the average human ear perceives and less weight on those that the average human does not hear as well. "A-weighted" is defined as a specific weighting of the sound pressure level for the purpose of determining the human response to sound (MPCA 2008). Humans can detect sound changes of 3 dBA, with a significant change noticeable at 5 dBA. Frequencies that are not heard as well by humans include those that are very high and very low.

Although more serious conditions such as hearing loss may be attributed to prolonged exposure to high noise levels, the primary human response is annoyance. Agricultural and/or rural environments, like that found within the Site, include common sound sources such as farm equipment (e.g., tractors, combines), roadway traffic, animals (e.g., birds), and wind moving through vegetation. Table 4.2-1 provides a comparison of typical common noise-generating sources.

Table 4.2-1. Decibel Levels of Common Noise Sources

Common Noise Source	Sound Pressure Level (dBA)
Jet engine (at 25 m)	140
Jet aircraft (at 100 m)	130
Rock concert	120
Pneumatic chipper	110
Jackhammer (at 1 m), tractor at 80% load	100
Chainsaw, lawn mower (at 1 m)	90

Common Noise Source	Sound Pressure Level (dBA)
Heavy truck traffic, tractor idling	80
Business office, vacuum cleaner	70
Conversation speech, typical television volume	60
Library	50
Bedroom	40
Secluded woods	30
Whisper	20

Source: MPCA (2008).

The MPCA adopts standards that describe the maximum levels of noise in terms of sound pressure level that may occur in an outdoor atmosphere (Minn. Stat. § 116.07, subd. 2). No single standard is applicable to all areas of the state. The noise pollution control standards set forth in Minn. R. 7030 are determined based on noise intensity, duration, type, frequency, time period (daytime/nighttime), and the effect the noise may have on the surrounding environment. Generally, the daytime/nighttime standards are broken down into three noise area classifications (residential, commercial, and industrial) and are outlined in Table 4.2-2. The Site is categorized as "Noise Area 1 (residential)."

Table 4.2-2. Minnesota Pollution Control Agency State Noise Standards – Hourly A-Weighted Decibels

Noise Area Classification	Daytime		Nighttime	
	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: MPCA (2008), Minn. R. 7030.004.

Note: "L_{10}" means the sound level, expressed in dBA, which is exceeded 10% of the time for a 1-hour survey, as measured by test procedures approved by the commissioner. "L_{50}" means the sound level, expressed in dBA, which is exceeded 50% of the time for a 1-hour survey, as measured by test procedures approved by the commissioner. "Daytime" means those hours from 7:00 a.m. to 10:00 p.m. "Nighttime" means those hours from 10:00 p.m. to 7:00 a.m.

Noise Area Classification 1 receptors are protected by the lowest sound level limits of the MPCA. Because the BESS can operate under conditions resulting in maximum sound power during both day and night, the Project would need to comply with both daytime and nighttime limits. Therefore, Benton Solar evaluated Noise Area Classification 1 receptors against the nighttime L_{50} sound level limit of 50 dBA, which is the most stringent limit.

Existing sound levels have not been measured at the Site. However, based on sound level measurement programs for similar areas in Minnesota, the hourly L_{50} sound level would be expected to range from approximately 20 to 65 dBA, with nighttime levels ranging from 20 to 55 dBA. Typical existing sound sources include vehicles on local roads, rustling vegetation, livestock, farm equipment, aircraft, insects, and birds. American National Standards Institute/Acoustical Society of America S12.9-2013/Part 3 provides continuous background sound levels for various residential land use categories (American National Standards Institute/Acoustical Society of America 2013). Within the standard, the category with the smallest population density of 200 people per square mile, described as "very quiet suburban and rural residential," would be the most representative category for the Project's location within Benton County. This category has a daytime sound level of 40 dBA and a nighttime sound level of 34 dBA.

4.2.3.2 IMPACTS AND MITIGATION

4.2.3.2.1 Construction

Potential Project-related impacts are likely to include short-term, intermittent noise associated with construction vehicles and equipment within and adjacent to the Site. Throughout Project construction, noise levels will vary depending on the type and quantity of equipment being used and the distance to receptors. Project construction will be sequenced, and different construction activities may occur simultaneously in separate sections of the Preliminary Development Area. For example, once Site preparation is completed in a large section of the Preliminary Development Area, Benton Solar will begin Facility installation. Site preparation will require the use of grading equipment, bobcats, and other equipment. Such equipment is anticipated to emit noise between 76 and 85 dBA at 50 feet (U.S. Department of Transportation 2017). One example of Facility installation activity is pile driving of rack supports, expected to create levels of 101 dBA at 50 feet with an installation time per rack support of 30 seconds to 2 minutes (U.S. Department of Transportation 2017). Construction activities will be limited to daylight hours to the extent practicable.

4.2.3.2.2 Operation

Benton Solar modeled sound levels associated with Project operation using the CadnaA sound level calculation software developed by DataKustik GmbH. This software uses the International Organization for Standardization (ISO) 9613-2 international standard for sound propagation. CadnaA allows for calculation from multiple sound sources, as well as computation of diffraction, drop-off with distance, ground attenuation, atmospheric absorption, multiple reflections, and barrier effects. The CadnaA software package is widely used in the field of acoustics for analyzing sound level impacts.

The primary sources of sound from the Project will be the solar inverters, BESS inverters, BESS containers, and the substation step-up transformer. Although the Project will utilize a tracking system, tracking motors were not included in the sound analysis. Sound levels associated with tracking motors are typically significantly less than the sound levels associated with inverters. In addition, these motors generally only operate for a total of minutes, not hours, during the day as the motors periodically cycle on for a few seconds to adjust the orientation of the panels with respect to the sun. Table 4.2-3 presents these Facility types, an anticipated model, and the approximate distance from the equipment to where the MPCA noise standard of 50 dBA is reached.

Table 4.2-3. Example Noise Levels

Facility	Equipment Model*	Distance (feet) to 50 dBA
Solar Facility		
Power Conversion Unit	SMA SC 4.0 megavolt amperes (MVA)	160
BESS		
Power Conversion System	Power Electronics PCSM Gen 3 FP4200M2	305
Battery Container	CATL EnerC+ 4 MWh Battery Storage System Container	270
Substation		
Step-up Transformer	Hyundai 115.0 MVA	200

* Facility and equipment selections are preliminary and have not been finalized.

The sound level modeling analysis for the Project included 29 solar inverters, 44 (32 primary plus 12 augmentation) BESS inverters, 176 (128 primary plus 48 augmentation) BESS containers, and one 115-megavolt amperes transformer. Sound data from manufacturer specification sheets for Project inverters and

containers were utilized in the analysis. The sound power level for the transformer was estimated using techniques in the Electric Power Plant Environmental Noise Guide (Bolt, Beranek, and Newman Inc. 1984). An uncertainty factor, or safety margin, of 2.0 dBA was added to the sound power levels for each modeled piece of equipment to account for any tolerances or uncertainty in the modeling methodology and reference sound level data used as input.

In all, 549 receptors were input into the CadnaA model. The receptors were modeled as discrete points at a height of 5 feet (1.5 m) above ground level, which is the approximate ear height of a standing person. All receptors were assigned as Noise Area Category 1. Elevation contours for the modeling domain were imported into CadnaA, which allowed for calculation of terrain shielding where appropriate. Spectral ground absorption was calculated using a G-factor of 0.5 over the Preliminary Development Area to represent a moderately reflective surface characterized by a mixture of hard and porous ground, which is a conservative assumption for much of the year when the ground would be covered in vegetation. The substation and BESS areas were modeled using a G-factor of 0.0, representing a completely reflective (i.e., hard) surface.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs, were implemented in the CadnaA model to ensure conservative results (i.e., higher sound levels), and are described below.

- All modeled sources were assumed to be operating simultaneously at their maximum sound level corresponding to the greatest sound level impacts.
- Per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed, ground-based temperature inversion, as might occur on a calm, clear night, or equivalently downwind propagation.
- Meteorological conditions assumed in the model (i.e., temperature of 10.0°C and relative humidity of 70.0%) were selected to minimize atmospheric attenuation in the 500 Hz and 1,000 Hz octave bands where the human ear is most sensitive.
- No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model. While these factors can impact the sound levels under certain conditions, they cannot be relied upon for continuous mitigation. Because the model was designed for the calculation of worst-case conditions, additional attenuation was not included.

In order to minimize sound level impacts and meet regulatory requirements with respect to sound, several mitigation measures were implemented into the analysis. These included 25.0-foot barrier walls around equipment at the BESS, inclusion of a noise attenuation kit for all 44 BESS inverters, and silencers for all 176 battery containers. At this time, both Project equipment and mitigation are preliminary in design. A variety of combinations with respect to mitigation options can be implemented to ensure compliance at Noise Area Category 1 receptors and is dependent upon final equipment selection. Refinements to the mitigation analysis will be conducted at that time, and implementation of final mitigation measures may include some or all of the mitigation included in the sound analysis.

All modeled sound levels, as output from CadnaA, are A-weighted equivalent sound levels (Leq, dBA). For this analysis, the equivalent sound level has been assumed to be comparable to the median (L_{50}, dBA) sound level under the operational conditions evaluated. Therefore, the modeled sound levels may be considered as L_{50} sound levels and directly compared to the Minnesota L_{50} limit.

The modeled sound levels from the Project at the 549 receptors are shown in Appendix G. The highest predicted worst-case Project-only L_{50} sound level is 45 dBA, which is at Receptor No. 234. When combined with a nighttime existing sound level of 34 dBA from the American National Standards Institute/Acoustical

Society of America standard, the total sound level is 45 dBA, which is well below the 50 dBA limit. Ambient sound levels can fluctuate due to a variety of existing sound sources, which have the potential to cause existing sound levels to be equal to or exceed the MPCA L_{50} nighttime limit of 50 dBA. In these instances, the increase to existing sound levels due to the Project will be 0 to 1 dBA. Under conditions where two sound levels have the same or very similar characteristics, a 1-dBA change is imperceptible to the average person. Appendix G presents total sound levels for a range of ambient sound levels between 34 and 50 dBA.

4.2.4 Electric and Magnetic Fields and Stray Voltage

4.2.4.1 EXISTING CONDITIONS

EMFs are invisible areas of energy associated with the use of electrical power and various forms of natural and human-made lighting (National Institute of Environmental Health Sciences [NIEHS] 2022). Power frequency EMFs are created wherever electricity flows and result from movement of electrical charges on a conductor (e.g., wiring in homes and schools; transmission lines and power [feeder] lines; electrical equipment and devices commonly used at workplaces and in homes). The intensity of the electric portion of EMF is related to the potential or voltage of the charge on a conductor, and the intensity of the magnetic portion of the EMF is related to the flow of charge or current through a conductor (NIEHS and National Institutes of Health [NIH] 2002).

Existing sources of produced EMFs in the Site include transmission lines, electrical wiring, and electrical equipment. Project EMF sources would also include the electrical collection system, which will deliver power to the collector substation. The electrical collection system will be direct buried cable. EMFs associated with electrical collection lines rapidly dissipate with increased distance from the source (NIEHS and NIH 2002). Currently, there is no federal standard for transmission line EMFs. However, the internationally accepted guideline for exposure to EMF is 833 milligauss (mG) (NIEHS and NIH 2002). The Commission limits the maximum electric field under high-voltage transmission lines in Minnesota to 8.0 kV/m. The Commission has not adopted a standard for magnetic fields.

Stray voltage is a natural phenomenon that results when two grounded objects unintentionally transfer electricity between each other. To minimize the occurrence of stray voltage, electrical systems must be adequately grounded to ensure safety and reliability and to minimize current flow. Typical causes of stray voltage include faulty utility connections or improperly grounded electrical equipment in farm buildings. Stray voltage can cause a person or animal to come into contact with neutral-to-earth voltage, but it does not cause electrocution and is not related to ground current, EMF, or earth currents.

4.2.4.2 IMPACTS AND MITIGATION

The Applicant expects that Project EMF levels would dissipate to acceptable background levels before reaching any residences. Therefore, Benton Solar does not expect the Project to result in adverse impacts related to EMFs and no mitigation measures are proposed.

To mitigate the occurrence of stray voltage, Benton Solar will ground all of the Project's electrical components (e.g., inverters, step-up transformers) in accordance with the National Electric Safety Code. Additionally, Benton Solar will take soil resistivity measurements on-site as part of the Project's geotechnical analysis and will use these data in designing appropriate grounding systems for the Project. For these reasons, Benton Solar does not expect stray voltage to occur as a result of the Project. If a fault occurs during Project operation, it will be quickly identified by the Project's monitoring systems and corrective actions will be implemented.

4.2.5 Aesthetics

4.2.5.1 EXISTING CONDITIONS

Aesthetic quality and appeal of a region generally derive from the terrain, natural features (e.g., mountains, lakes, rivers, ponds), native flora, and cultural features that define the landscape. High-quality scenery, including natural-appearing landscapes, enhances people's lives and benefits society (U.S. Forest Service 1995). Individual observers will have differing opinions on the aesthetic appeal of a region and the impacts that may alter its quality. The dominant visual characteristic of the Site is flat, agricultural land cover with fragmented forested cover associated with the Elk River and remnant / planted forest stands (Section 4.2.10). SH 95 intersects the Site, and several county and township roads occur within the Site. Additionally, existing transmission lines are located in the Site. The State of Minnesota has not yet analyzed Benton County for Visual Sensitivity Corridors (MDNR 2023c). The nearest Minnesota Scenic Byway is the Great River Road All-American Scenic Byway, located more than 5 miles west of the Site near Sauk Rapids and St. Cloud.

Constructed Facilities (e.g., solar panels mounted on a tracking system, centralized PCUs, BESS, substation) would be added to the landscape (see Figure 3 and Appendix B). The Project would be visible to local and regional travelers along SHs 23 and 95 and county and township roads, and to recreational users such as those traveling the Benton County trails (maintained by the Benton County Snowmobile Club) located near the Site (Section 4.2.8.1).

There are 287 residences within 1.0 mile of the Site (Appendix F). Sixty of these residences are within 1,000 feet of the Site (Table 4.2-4) (Figure 6). No residences occur within the Site. The distance from a solar panel to the nearest residence is 314.7 feet. Residences within 1.0 mile of the Site, including the distance to the Site and distance to the edge of the nearest solar array, are provided in Appendix F.

Table 4.2-4. Summary of Residences within 1,000 Feet of the Site

Residence No.*	Existing Vegetative Screening
1	Extensive vegetative screening is present on all sides of the residence, with dense tree cover providing significant coverage between the residence and the Site. This tree line offers substantial protection, making the Project less likely to be visible from the residence although visibility is possible to the east.
2	Partial vegetative screening is present along the northern perimeter of the property, consisting of a mix of deciduous trees that likely provide moderate coverage. Scattered to minimal vegetation is present along the remaining perimeters. The Project may be visible primarily from the east and to a lesser extent, from the north and south.
3	Substantial vegetative screening is present along the west and south sides of the residence, consisting of dense deciduous trees that provide coverage. There is partial screening with more open views through sparse tree cover to the east and northeast. The Project is likely to be most visible from the east and northeast, with minimal visibility from the west and south due to the dense tree cover.
4	The residence appears to be fully surrounded by deciduous trees, which provide significant screening during the growing season. Project visibility may increase during leaf-off.
5	A dense line of coniferous trees is present along the northern and eastern borders of the residence, which may provide substantial year-round screening from the Site. The south side has a line of deciduous trees, offering coverage during the growing season. The Project may be visible from the south and east, particularly during leaf-off.
6	The property is bounded by a large, wooded area immediately to the north, west, and east, which provides significant natural screening from the Site. There is little to no vegetation present on the south side of the property, and the Site is likely visible from that point.
7	Dense vegetative screening is present along the south and east sides of the residence.

Residence No.*	Existing Vegetative Screening
8	A line of trees provides substantial screening along the east side of the residence. Vegetation is sparser on the south side, from which the Project is likely to be visible.
9	The residence benefits from moderate vegetative screening, particularly on the northwest and west sides, with substantial screening from the southwest when foliage is present. There is some coverage from trees on the south side, but it becomes sparser toward the northeast.
10	Dense vegetative screening is present along the north side of the residence, with a dense tree line offering coverage between the property and the Site. There is more minimal vegetation to the south.
11	Extensive vegetation is present along the west and south sides of the residence, consisting of dense deciduous trees. A more scattered and less dense tree line is present to the northeast, from which the Site may be visible.
12	Dense vegetation on the other side of the Site may offer screening to the east of this residence. Project views may still be visible from the northeast.
13	Moderate vegetative screening is present along the western perimeter, consisting of a mix of deciduous and coniferous trees that provide partial coverage from the road. The eastern perimeter, facing the Site, has minimal vegetative screening. Limited tree coverage is present to the north. The Project is likely to be most visible from the east and northeast, with moderate screening from the west.
14	Vegetative screening is present along the south side of the residence, offering substantial coverage in that direction. Vegetation becomes sparse on the east and southeast sides, and the Project may be more visible from these perspectives.
15	Minimal vegetative screening is present along the west and south sides of the residence. The Project is likely to be visible from the southwest and west.
16	Some vegetative screening is present along the west side of the residence, with sparse tree cover. The Project is likely to be visible from the property.
17	Moderate vegetative screening is present along the south side of the residence, with a line of trees providing some coverage from the project boundary. While the trees offer partial protection from the Project, screening may be limited during leaf-off seasons.
18	The dense line of conifers to the west of the property offers substantial screening from the Project, although views of the Project may only be partially screened to the southeast.
19	Deciduous trees provide moderate screening around the residence, particularly to the south and east, during the growing season. The Project may be visible to the north of the residence.
20	Moderate vegetative screening is present along the north and west sides of the residence, with scattered trees offering some coverage. Partial exposure is likely from the south, east, and west, where there is more minimal tree cover.
21	Moderate vegetative screening is present along the west and north sides of the residence, consisting of scattered trees and shrubs that provide partial coverage. This vegetation is likely to obscure some views of the Project, while visibility is likely possible from certain points.
22	A substantial line of coniferous trees provides strong year-round screening to the west. There is minimal vegetation to the east and south, and the Project is likely visible from those directions.
23	Minimal vegetative screening and sparse tree coverage is present along the southern and northern perimeters. A line of deciduous trees provides partial screening along the eastern perimeter, reducing views of the Project. The Project is likely to be most visible from the north and south, with partial screening to the east.
24	Vegetative screening is primarily present to the south of the residence, while the west side, which faces the project boundary, has minimal tree cover.
25	Extensive vegetative screening is present along the north, east, and south sides of the residence, consisting of dense forest that provides significant coverage. The west side has minimal tree cover, and the Project will be visible from this perspective.
26	Moderate screening is provided by deciduous trees along the south and east sides of the residence. The vegetation offers coverage during the growing season, and Project visibility may increase during leaf-off.
27	Deciduous trees provide moderate screening on the east side of the residence. The vegetation offers coverage during the growing season, and Project visibility may increase during leaf-off.
28	Heavy vegetative screening is present along the north side of the residence, consisting of dense trees that provide substantial coverage. The Project may be visible to the northeast.

Residence No.*	Existing Vegetative Screening
29	Minimal vegetative screening is present directly around the residence. A dense stand of trees along the Site is likely to screen views of the Project to the west and northwest.
30	Minimal vegetative screening is present along the west side of the residence.
31	Dense vegetative screening, including both deciduous and coniferous trees, provides significant year-round coverage. This dense tree cover is likely to obscure most views of the Project, including during leaf-off seasons.
32	Minimal vegetative screening is present around the residence, particularly on the west and south sides.
33	There are a few scattered deciduous trees around the property, particularly on the east side and near the structures. The Project may be visible along 30th Street NE, particularly during the fall and winter months when leaves are absent.
34	The residence is surrounded by intermittent vegetative cover. The east side has minimal screening.
35	This residence is surrounded by a combination of coniferous and deciduous trees, particularly on the east side. Views of the Project will most likely be completely obscured by dense tree cover along the Site to the northeast and east.
36	Dense screening is present around the residence. Views of the Project are most likely blocked or obscured.
37	Heavy vegetative screening is present along the south and west sides of the residence, with dense forest cover providing substantial screening. The Project is unlikely to be visible from these directions due to the dense tree coverage.
38	Extensive vegetative screening is present along the south side of the residence, with a dense line of trees providing substantial coverage between the property and the Project.
39	Dense vegetation almost fully surrounds the residence, offering substantial screening from all sides. The combination of deciduous and coniferous trees provides year-round coverage, and views of the Project would be extremely limited.
40	Substantial conifer screening is present along the northeast side. The conifers are arranged in a dense row, providing significant visual obstruction from theProject to the east.
41	Dense vegetative screening is present along the south and west sides of the residence, providing significant coverage. The Project may be visible to the northwest, where there is less tree cover.
42	Vegetative screening is mostly located to the south, with the west side more open. The Project is likely to be visible from the west due to the absence of significant vegetation.
43	Dense deciduous vegetation between the residence and the Project provides substantial screening. The vegetation offers coverage during the growing season, and Project visibility may increase during leaf-off.
44	The property is bounded by dense coniferous and deciduous trees to the north, south, and east. The east side of the property, which faces the Project, has a dense tree line that provides year-round screening, making it unlikely that the Project will be visible.
45	Extensive vegetative screening is present along the west side of the residence, with a dense line of trees providing substantial coverage. The Project is unlikely to be visible from the west due to significant tree cover.
46	Extensive vegetative screening surrounds the residence to the south and west, with dense forest providing substantial coverage. This tree cover is likely to block most views of the Project.
47	There is dense vegetative screening along the north and south sides of the residence, providing substantial coverage in these directions. The Project is likely to be visible to the west, where the vegetation is less dense.
48	Minimal to no vegetative screening is present immediately around the residence.
49	Extensive vegetative screening is present along the north and west sides of the residence, consisting of dense deciduous trees that provide substantial coverage. The vegetation offers coverage during the growing season, and Project visibility may increase during leaf-off.
50	This residence is surrounded by a dense tree line, particularly to the west and north, providing significant screening year-round. The Project is unlikely to be visible due to this coverage.
51	Dense vegetative screening is present along the west side of the residence, with a dense line of trees offering significant coverage. The Project is unlikely to be visible from the west due to the existing tree cover.
52	Screening is present along the south and west sides of the residence, with scattered trees providing partial coverage. The Project may be visible from the southwest due to gaps in the tree cover.

Residence No.*	Existing Vegetative Screening
53	Minimal vegetative screening is present around the residence, particularly along the south side. The Project is likely to be visible from the south and southwest due to the sparse tree cover in those directions.
54	The property includes a dense line of trees along its north and south sides, with sparser screening to the northeast and southeast.
55	The vegetation surrounding the pond to the west provides significant natural screening, which would likely block most views of the Project in that direction. When foliage is off in the fall and winter, there may be visibility to the northwest, but this exposure would remain limited due to the tree density in that area.
56	Well-established vegetative screening is present along the west side of the residence, with dense trees providing substantial coverage. The Project is unlikely to be visible from the west due to the heavy tree cover.
57	There is extensive vegetative screening surrounding the residence. This thick coverage effectively blocks views toward the Project located west and southwest.
58	Vegetative screening is present around the residence, primarily consisting of scattered conifers to the east and south of the property. The Project views will most likely be obscured by the dense tree cover along the Site to the northeast and east.
59	The property includes dense vegetation along the west and south sides, providing significant screening and coverage.
60	Sparse vegetation and shrubs present along the west side of the residence offers some screening from the Project.

* Residence numbers are keyed to Figure 6.

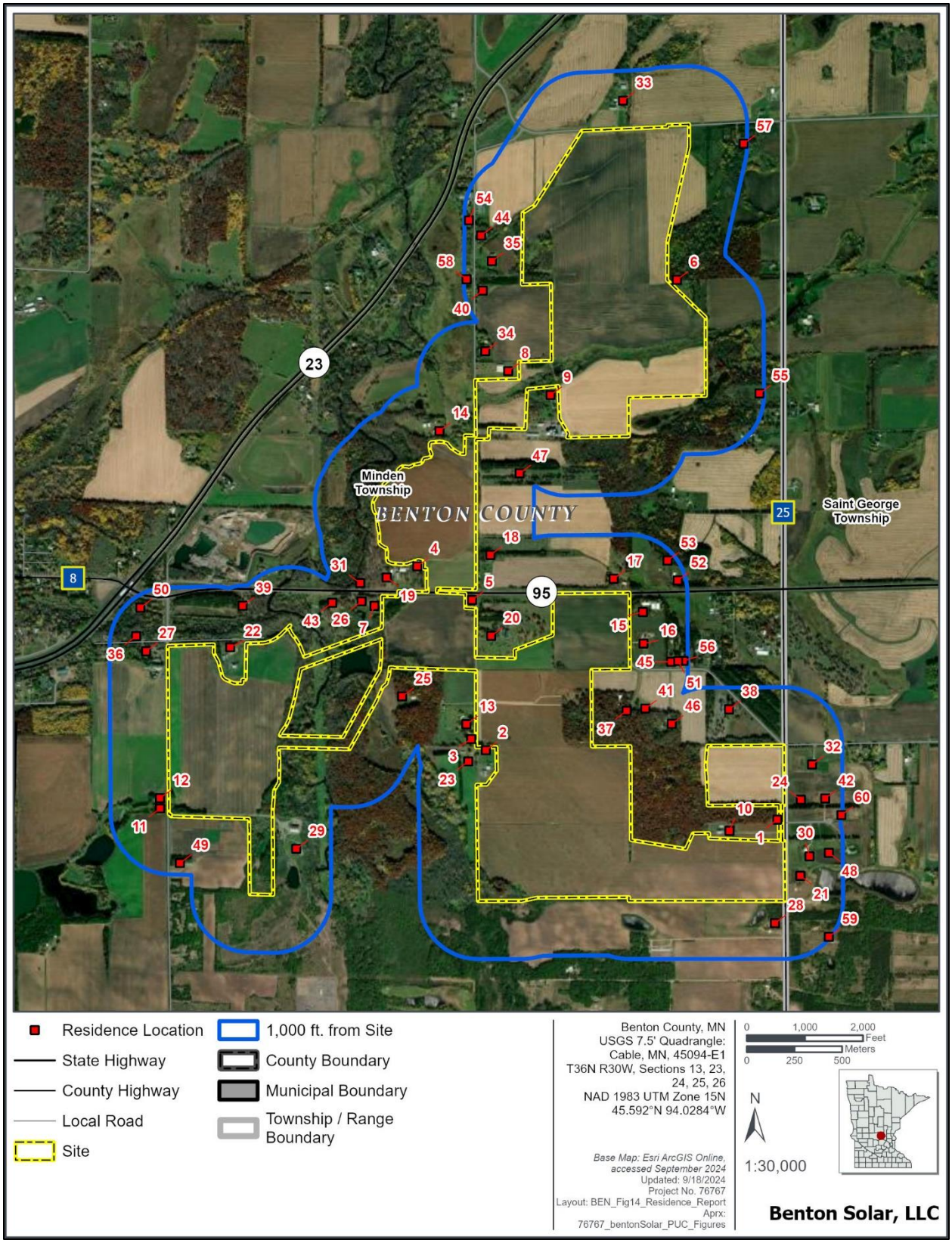

Figure 6. Residences within 1,000 feet of the Site.

4.2.5.2 IMPACTS AND MITIGATION

The degree to which the Project will be visible will vary by location. The Project may be visible to individuals occupying residences within 1.0 mile of the Site or travelers using roads in and near the Site, including SHs 23 and 95. The Project may also be visible to recreational users, such as those utilizing Benton County trails (Section 4.2.8.1). However, constructed features (e.g., existing transmission lines) are currently present on the Site. Further, topography and natural landscape features such as tree cover, in relation to a viewer's physical location, often will impede the view of the Project.

The Project will convert current land cover (the majority of which is cultivated crop and hay/pasture) into the Solar Facility, BESS, and associated facilities for the life of the Project. Additionally, 569.5 acres will be revegetated with a regionally appropriate seed mix that is anticipated to produce blooms in multiple seasons and support wildlife, including pollinators (Appendix D). The primary visual impact from the Project will be the solar panels (each with a height of 10.0 to 12.0 feet depending on array tilt); perimeter fencing (height of 10.0 feet); and a substation (structure height is 50.0 to 60.0 feet). Visually, the Project will be mostly low profile, with the substation having the tallest vertical profile. The introduced Facilities would be visible during the day due to visual contrast and potential surface glare and at night due to potential Project lighting. Project lighting will be downlit as Project light sources will project light downward. Solar panels are constructed of dark, light-absorbing materials coated with an anti-reflective substance to reduce and limit reflection. Glint and glare from the panels will be reduced by using dark colors to absorb rather than reflect light. Depending on the angle of the sun and the use of anti-reflective coatings, modern panels reflect as little as 2% of incoming sunlight. A Project glint and glare analysis was completed in 2022. Results of the analysis indicated there were no predicted glare occurrences for aircraft approach paths or air traffic controller personnel, and no predicted glare occurrences for nearby residences or roadways (Capitol Airspace Group 2022).

Benton Solar will implement BMPs to minimize the impact the Project could have on existing scenic integrity and will incorporate the county setback and visual screening requirements in the Project design, where necessary (see Section 3.3). Facilities will be designed and sited to minimize visual impacts and to maximize the feasible distance of Facilities from public road and trail crossings.

4.2.6 Socioeconomics and Environmental Justice

4.2.6.1 SOCIOECONOMICS

Benton Solar evaluated the Project's effect on socioeconomic indicators such as population levels, community demographics, availability of housing and temporary accommodations, income, and employment.

The socioeconomic assessment area was defined to include communities reasonably likely to be affected by the Project. After considering: 1) the Project's likely effect on resources such as air quality, noise levels, viewscapes, and labor pools; and 2) the distribution of population centers illustrated in Figure 1, the socioeconomic assessment area was, unless otherwise noted, defined as Minden Township in Benton County, Minnesota.

Section 4.2.6.1.1. presents existing conditions in Minden Township and Benton County, Minnesota. State-level information and information for the city of St. Cloud, Minnesota, which is the nearest municipality, is presented to provide additional context.

Socioeconomic impacts as discussed in subsequent sections primarily are driven by: 1) the employment of 150 to 300 individuals during the approximately 14 months of construction, which includes a 16-week

winter break during which construction is expected to be scaled back substantially; 2) labor-related payroll expenditures, including use of prevailing wages; 3) annual tax payments of approximately $250,000; and 4) annual land access payments of approximately $2,700,000.

4.2.6.1.1 Existing Conditions

Population Level and Ethnicity

Minden Township has a population of 1,404. There are estimated to be seven people who identify as Hispanic or Latino of any race and 16 people who identify as American Indian. Benton County has a population of 41,087, which represents 0.7% of the total Minnesota state population. Approximately 2.9% of county residents self-identify as Hispanic or Latino (Table 4.2-5).

Table 4.2-5. Population Level and Ethnicity Demographics

Population Sector	Minden Township	Benton County	St. Cloud	Minnesota
Total population	1,404	41,087	68,430	5,670,472
Hispanic or Latino of any race	7	1,193	2,778	319,828
White alone not Hispanic	1,381	36,163	48,380	4,441,935
Black or African American alone	0	1,919	11,220	371,249
American Indian alone	16	59	274	46,371
Asian alone	0	422	2,384	281,572
Native Hawaiian or Pacific Islander alone	0	3	0	2,047
Some other race alone	0	18	261	17,042
Two or more races	0	1,310	3,133	190,428

Source: Economic Profile System (EPS) (2023).

Languages Spoken

Table 4.2-6 presents language demographics as estimated in the U.S. Census Bureau's (USCB's) American Community Survey (ACS) 2021 5-year estimates. All but eight of Minden Township's residents over 5 years of age report speaking only English, and no residents report speaking English less than "very well." In Benton County, 2.1% of individuals speak English less than "very well."

Table 4.2-6. Language Demographics

Population Sector	Minden Township	Benton County	St. Cloud	Minnesota
Total population	1,404	41,087	68,430	5,670,472
Population 5 years or older	1,338	38,453	64,094	5,322,004
Speak only English	1,330	36,261	53,469	4,683,934
Speak a language other than English	8	2,192	10,625	638,070
Spanish or Spanish Creole	3	687	1,983	207,272
Other Indo-European languages	5	473	1,466	105,092
Asian and Pacific Island languages	0	210	1,646	182,624
Other languages	0	807	5,440	136,770
Speak English less than "very well"	0	800	4,022	239,624

Source: EPS (2023).

Housing and Temporary Accommodations

According to the USCB's ACS 2021 5-year estimates, there are 42 vacant housing units in Minden Township. Benton County has 845 vacant housing units, which represents 0.4% of the total vacant housing in Minnesota (241,383) (Economic Profile System [EPS] 2023).

The largest nearby population center is the city of St. Cloud (see Figure 1). St. Cloud has 1,586 vacant housing units (EPS 2023). In addition, according to Visit St. Cloud (2023), there are 22 hotels and motels, three bed and breakfasts, and seven campgrounds in the greater St. Cloud area.

Income and Employment

Table 4.2-7 presents per capita income level, persons in poverty, and the unemployment rate as estimated in the USCB ACS 2021 5-year estimates and the Bureau of Labor Statistics Local Area Unemployment Statistics.

Table 4.2-7. Per Capita Income Level, Persons in Poverty, and Unemployment Rate

State/County/City	Per Capita Income Level (U.S. dollars)	Persons in Poverty	Estimates Unemployment Rate
Minnesota	$41,204	9.2%	3.4%
St. Cloud	$28,896	22.0%	N/A
Benton County	$32,884	9.5%	4.3%
Minden Township	$44,382	1.4%	N/A

Source: EPS (2023).
Note: N/A = not available.

The per capita income of Minden Township is $44,382, which is $3,178 higher than the Minnesota state average of $41,204 and $11,498 higher than the Benton County average of $32,884. The unemployment rate in Minden Township is not reported by the Bureau of Labor Statistics. The percentage of individuals living at or below the poverty level (1.4%) is less than the state average (9.2%). The unemployment rate in Benton County (4.3%) is higher than the state average of (3.4%), and the proportion of individuals living at or below the poverty level (9.5%) is marginally higher than the state average at (9.2%) (EPS 2023).

Educational services, health care, and social assistance make up 23.5% of the civilian employed population 16 years or older in Minden Township, followed by transportation, warehousing, and utilities (12.9%); manufacturing (11.2%); and construction (10.9%). Educational services, health care, and social assistance make up 27.8% of the civilian employed population 16 years or older in Benton County, followed by manufacturing (15.2%) and retail trade (12.0%) (EPS 2023).

4.2.6.1.2 Impacts and Mitigation

Benton Solar intends to employ local contractors and businesses during construction when feasible. Benton Solar will attempt to hire workers formerly employed at retired or retiring generation facilities to ensure construction can be completed in a safe and efficient manner. Requests for Proposals to administer and carry out Project construction will be issued to qualified Balance of Plant contractors. During Request for Proposal review, Benton Solar plans to place greater preference on proposals that employ local and/or union construction and craft employees while also taking into consideration feasibility in terms of the Project's construction timeline and safety requirements. The selected contractor is expected to initiate collaboration with labor unions and other interested parties to create a framework of hiring practices that generate and

maximize benefits to local economies.[3] In addition, regional contractors and subcontractors will potentially have opportunities to benefit from providing labor services related to gravel, fill, and civil work. Additional potential economic benefits and revenue would come from local Project construction and management expenditures.

Benton Solar has secured property access through voluntary lease or purchase agreements. Such payments tend to stimulate local economic activity and leave local landowners better off.

One concern commonly expressed in relation to solar projects is that the value of surrounding properties may be diminished. The existing literature suggests that is not the case in rural areas. A study by CohnReznick LLP (2018), for example, reviewed information on the property value trends of lands adjacent to nine existing solar panel farms and concluded that proximity to solar farms had not deterred sales of nearby agricultural land and residential single family homes. Further, as stated in the analysis conducted for the Project, "there is no market data indicating the project will have a negative impact on either rural residential or agricultural property values in the surrounding area" (see Appendix H).

Impacts to Population Levels and Demographics

To the extent that nonlocal laborers are required to augment the local labor pool, the influx of additional Project construction workers would have a minor, short-term effect on local population levels and demographic composition. Negligible population or demographic impacts are anticipated during Project operation.

Impacts to Housing and Temporary Accommodations

During Project construction (approximately 14 months, which includes a 16-week winter break during which construction is expected to be scaled back substantially), the average number of construction personnel on-site per day is expected to be 150 personnel, with a maximum of 300 personnel for peak construction periods. Local workers (workers who live within commuting distance of the Project) will be used to the extent possible. When local labor is unavailable, employees from outside local areas will be brought in. Project O&M will require two to three employees to be dedicated full time to the Project.

During Project construction, nonlocal laborers would likely use nearby campgrounds, hotels, or motels. Given the presence of 22 hotels and motels, three bed and breakfasts, and seven campgrounds within the greater St. Cloud area, even if all 150 to 300 workers required temporary accommodations, the market should be able to accommodate the workers, and their presence should not displace a material number of individuals who would otherwise use these facilities. Thus, the influx of Project-related workers during construction is characterized as a modest, short-term increase in demand for local accommodations.

Project O&M would have no material effect on the local accommodations market.

Impacts to Employment Levels and Income

During the approximately 14-month Project construction period that includes a 16-week winter break during which construction is expected to be scaled back substantially, the average daily on-site workforce is likely to range from 150 to 300 individuals. Many of these workers would require accommodation, food

[3] Benton Solar anticipates some phases of Project construction will require specialized labor skills from licensed contractors and subcontractors with adequate and relevant expertise. If no acceptable local sources of specialized labor are available, expertise and services from businesses in other regions of Minnesota and/or surrounding states would be used if a short construction activity window would preclude specialized or Project-specific training of locally or regionally available contractors. Furthermore, most assembly and wiring for solar installations is considered electrical work under the Minnesota State Electrical Code, which requires electricians licensed in the state of Minnesota.

services, fuel, and transportation. In addition, the Project itself may source some supplies locally. This would represent a short-term increase in local employment opportunities and income among the local labor force and businesses. A study conducted by the University of Minnesota Extension estimated the Project would contribute $90.1 million in economic activity in Benton County during construction and $4.3 million in annual operations (Tuck 2023). Including indirect and induced economic impacts stimulated by the additional spending of local suppliers and employees, the study estimates the Project would support 330 jobs and $36.6 million in labor income during construction and 13 jobs and $645,000 in labor income during operations.

Minnesota has adopted a production tax of $1.20/MWh paid 80% to counties and 20% to the cities and townships. Benton County would receive production tax payments of approximately $200,000 annually over the life of the Project ($6,000,000 total assuming a Project life of 30 years). Additionally, as the township hosting the Project, Minden Township would receive approximately $50,000 annually ($1,500,000 total assuming a Project life of 30 years).

To put this revenue in context, Benton County reported annual expenditures of $40.0 million in 2021 (Benton County 2021), while Minden Township had total expenditures of $220,233 (State of Minnesota Office of the State Auditor 2021). Thus, the increase in revenue would represent modest beneficial impact to the county over the life of the Project, while the increase in revenue to Minden Township would be significant.

Finally, land access payments totaling approximately $2,000,000 annually for the life of the Project (approximately $60,000,000 total assuming 30 years) would compensate landowners for any losses associated with converting their property from agricultural to industrial use. These payments would apply to the 585.3 acres within the Preliminary Development Area, which equates to a payment of approximately $3,417.32 per acre-year. To put that level of revenue in context, the annual cropland rental rate in Benton County averaged $114 per acre-year in 2021 (University of Minnesota Extension 2021).

Socioeconomic Impact and Mitigation Summary

The Project would have a beneficial impact on socioeconomic conditions in and around Minden Township. These benefits would come primarily in the form of employment opportunities and direct spending during Project construction and increased tax revenue during Project operation. Because the only significant impact would be the increase in revenue to the township, no mitigation is necessary or proposed.

4.2.6.2 ENVIRONMENTAL JUSTICE

The MPCA and the U.S. Environmental Protection Agency (EPA) define environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies. The EPA also states that "fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies" (EPA 2023a; MPCA 2023a).

Benton Solar implemented an environmental justice assessment to determine if low-income communities, minority communities, or communities with limited English proficiency (i.e., environmental justice communities) are likely to be adversely and disproportionately affected by the Project. The assessment was conducted in three steps. First, census and environmental data were used to a) identify environmental justice communities in and around the Site; and b) characterize the area surrounding the Site with respect to existing environmental stressors. Second, information characterizing the Project's impact on environmental resources was used to determine if the Project is likely to affect environmental justice communities disproportionately and adversely. Finally, if the screening had identified the potential for disproportionate

and adverse impacts to minority or low-income communities (which it did not), then plans to mitigate those impacts would have been developed.

4.2.6.2.1 Identifying Environmental Justice Communities

Minn. Stat. 216B.1691, subd. 9 was recently amended to define an "environmental justice area" as an area in Minnesota that, based on the most recent data published by the USCB, meets one or more of the following criteria: 1) 40% or more of the area's total population is nonwhite; 2) 35% or more of households in the area have an income that is at or below 200% of the federal poverty level; 3) 40% or more of residents over the age of 5 have limited English proficiency; or 4) the area is located within Indian country, as defined in 18 United States Code 1151. Table 4.2-8 provides these environmental justice characteristics for the census block group[4] that contains the Site (Census Tract 203, Block Group 2 in Benton County) and three other census block groups that are within 1.0 mile of the Site.

Table 4.2-8. Environmental Justice Characteristics

Area	Nonwhite Population	Population with Income below 200% of the Federal Poverty Level	Residents over the Age of 5 with Limited English Proficiency*	Indian Country
Minnesota	21.7%	22.7%	4.5%	N/A
Benton County	12.0%	25.1%	2.1%	N/A
Census Tract 203, Block Group 1	2.8%	22.8%	1.3%	No
Census Tract 203, Block Group 2	1.9%	12.3%	0.2%	No
Sherburne County	11.1%	14.9%	1.2%	N/A
Census Tract 303.01, Block Group 1	1.3%	12.5%	0.2%	No
Census Tract 303.01, Block Group 2	6.6%	19.5%	0.0%	No

Sources: USCB (2023a, 2023b, 2023c); MPCA (2023b).
Note N/A = not available.
* Speak English less than "very well."

- The proposed Project location is in Census Tract 203, Block Group 2. Within this block group, 1.9% of residents self-identify as nonwhite (USCB 2023a); 12.3% of the population have income levels at or below 200% of the federal poverty level (USCB 2023b); 0.2% of residents 5 years of age or older speak English less than "very well" (USCB 2023b); and, according to MPCA (2023b), the block group is not in Indian country. Thus, the census block group that would host the Project does not meet the Minnesota criteria for being characterized as an environmental justice area. Additionally, none of the other three census block groups located within 1.0 mile of the Project meet any criteria to be considered environmental justice areas.
- Benton County, Minnesota, is 12.0% nonwhite (see Table 4.2-8); 25.1% of residents have income levels at or below 200% of the federal poverty level (USCB 2023b); 2.1% of residents 5 years of age or older speak English less than very well; and, according to MPCA (2023b), Benton County includes no Indian country. Thus, Benton County does not meet the Minnesota criteria for being characterized as an environmental justice area.

[4] The census block group is the smallest geographic unit for which the USCB reports the demographic data necessary to perform an environmental justice screening.

In addition to the screening criteria put forth by the MPCA, Benton Solar used data embedded in the EPA's online Environmental Justice Screening Tool (EJScreen) to determine if the communities surrounding the Project are subjected to unexpectedly high levels of environmental stressors.

The EJScreen report includes 12 Environmental Justice Indexes that characterize the Site with regard to particulate matter 2.5 microns in diameter or smaller ($PM_{2.5}$), ozone, diesel particulate matter, air toxics cancer risk, air toxics respiratory hazard index, traffic proximity, lead paint, Superfund proximity, risk management plan facility proximity, hazardous waste proximity, underground storage tanks, and wastewater discharge. Specifically, the EJScreen measures are reported as percentile ranks that indicate the ranking of a census tract relative to other census tracts. For example, a percentile rank of 75 for diesel particulate matter would indicate that nearly three quarters of census tracts are exposed to lower diesel particulate matter while one quarter of census tracts are exposed to higher levels.

All of the measures identified in the preceding paragraph rank below the 50th percentile in both the state and national rankings for the Site and the surrounding 1.0-mile buffer (EPA 2023b).

Combined, the environmental justice screening criteria put forth by Minnesota and the data embedded in EJScreen indicate that there are no environmental justice communities near the Site and that the communities surrounding the Site are not subjected to unexpectedly high levels of environmental stressors.

4.2.6.2.2 Evaluating the Potential for Disproportionate and Adverse Impacts

The Bureau of Land Management (2022) reports that determining whether the effect of a project on an environmental justice population is likely to be disproportionate is a matter of professional judgment. Specifically, they write that determining whether the effect of an impact would "appreciably exceed . . . those on the general population is a matter of judgment, taking all relevant information into account." It is suggested that analysts consider whether members of environmental justice communities are more sensitive to Project-related impacts than the general public because of income status, historical exclusion based on race or ethnicity, an inability to respond to the action, or increased exposure potential.

When conducting this environmental justice assessment, the full range of potential changes that could affect humans was considered (e.g., changes in air quality, changes in water quality, degradation of cultural resources, and socioeconomic alterations). In each instance, the analysis asked whether minority and low-income populations would have different ways, relative to the general population, of being adversely affected by the Project. Three specific questions provided below were posed. Both direct and indirect Project impacts were considered when answering these questions.

1. Are low-income or minority individuals likely to be disproportionality and adversely affected because they are more sensitive to a given level of exposure due to preexisting medical conditions, reduced access to health care, and/or because they are exposed to higher baseline concentrations of health stressors, such as $PM_{2.5}$?
2. Are low-income or minority individuals likely to be disproportional and adversely affected due to lifestyle approaches such as subsistence fishing or because they have different cultural, community, or religious practices?
3. Are low-income or minority individuals likely to be disproportionality and adversely affected because their economic status or language barriers prevent them from taking mitigating actions that general members of the public might readily adopt, such as closing doors and windows to limit dust exposure?

Benton Solar considered the Project setting and considered all potential Project impacts. Benton Solar identified no instances where low-income or minority individuals would be: 1) likely to be more sensitive

to a given level of Project-exposure; 2) likely to be disproportionately exposed due to lifestyle approaches; or 3) prevented from taking mitigating actions that general members of the public might readily adopt. This conclusion stems largely from the observation that, setting aside the Project's generally beneficial economic impacts, the Project's impacts (discussed throughout Section 4) mostly are contained within a 1.0-mile radius of the Site and there are no block groups identified as environmental justice communities within that radius.

Further, Benton Solar notes that Minden Township and the surrounding area do not have a material number of limited English-speaking households (see Section 4.2.6.1.1 and Table 4.2-8), which could otherwise hinder efforts to communicate Project details to the public. Additionally, Benton Solar is committed to paying prevailing wages, employing local contractors and businesses during construction, hiring workers formerly employed at retired or retiring generation facilities, and acquiring property access through voluntary lease or purchase agreements. Given this, Benton Solar concluded that the Project would not disproportionately and adversely impact low-income and minority populations.

4.2.6.2.3 Environmental Justice Conclusion

The Project is not anticipated to create environmental justice-related issues. This is because: 1) neither the block group nor the county that would contain the Project are environmental justice areas as defined by Minnesota; 2) the communities near the Site are not currently burdened by unexpectedly high levels of environmental stressors; and 3) the Project is not likely to affect disproportionately and adversely any low-income or minority individuals who do reside in the area.

4.2.7 Cultural Values

4.2.7.1 EXISTING CONDITIONS

Cultural values consist of a framework of attitudes, beliefs, and/or shared values that serve as a foundation of social cohesion and interaction within a community. Demographic information for the Site is provided in Section 4.2.6. No Native American events or activities or other ethnic activities or events occur within the Site.

Numerous cultural events are held in the region surrounding the Project. The Benton County Fair is held every August in Sauk Rapids and includes activities such as live music, carnival rides, and Native American pow wows. In addition, Sauk Rapids River Days is held annually in June and includes events such as a parade and pageant (Sauk Rapids River Days 2022). Additional community events and activities associated with Sauk Rapids and St. Cloud include nature reserves, city/municipal parks, performance arts centers, and at least one amusement park.

The greater St. Cloud area also hosts an annual spring pow wow through collaboration among The American Indian Center at St. Cloud State University, the St. Cloud Technical College, and local St. Cloud Area School District 742.

4.2.7.2 IMPACTS AND MITIGATION

The Project would not impact public participation in regional community events, and Benton Solar does not expect the Project to impact cultural values. Therefore, no mitigation measures are proposed.

4.2.8 Recreation

4.2.8.1 EXISTING CONDITIONS

The Site does not overlap any public conservation easements, officially designated wilderness areas, scientific or natural areas, wildlife management areas, or national wildlife refuges (Minnesota Board of

Water and Soil Resources 2023; U.S. Fish and Wildlife Service [USFWS] 2023a; Wilderness Connect 2023). The Sherburne Sands Conservation Opportunity Area overlaps the Site. Conservation opportunity areas are areas identified by the MDNR, through software and consideration of various criteria, as areas with potential for high conservation opportunity. The Site is privately owned and is not part of a current preservation project. Figure 7 and Table 4.2-9 present public recreational resources located within, or within 5.0 miles of, the Site.

Table 4.2-9. Public Recreational Resources Located within or within 5.0 Miles of the Site

Recreational Resource	Distance to Site (miles)
Elk River	Inside Site
Benton County Trails (maintained by the Benton County Snowmobile Club)	Inside Site
Donovan Lake	0.5
Territory Golf Club	0.5
Wapicada Golf Club	0.6
St. Cloud Regional Airport	1.8
Sand Prairie State Wildlife Management Area	2.4
St. Cloud Campground and RV Park	3.1
Woodland Hills Park	3.6
Central Minnesota Rest Area	3.9
Rice Lake	4.0
Harry W. Cater Homestead Prairie State Scientific and Natural Area	4.1
Goldthorpe Park	4.3
East Village Shopping Center	4.4
Sherburne County Snowmobile Trails	4.6
Rice Lake Savanna State Scientific and Natural Area	4.6
Reach-Up Park	4.6
Tower Park	4.7
Selke Field	4.7
Sterling Heights Park	4.7
Rotary East Park	4.8
Kiwanis Park	4.8
Bob Cross Park	4.8
Veterans of Foreign Wars Post 4847 Park	4.8
Mississippi	4.9
Clemens Gardens	4.9
Munsinger Park	4.9
Riverside Park	5.0
Talahi Park	5.0
Raymond Park	5.0

Sources: MDNR (2023d); USGS (2023a).

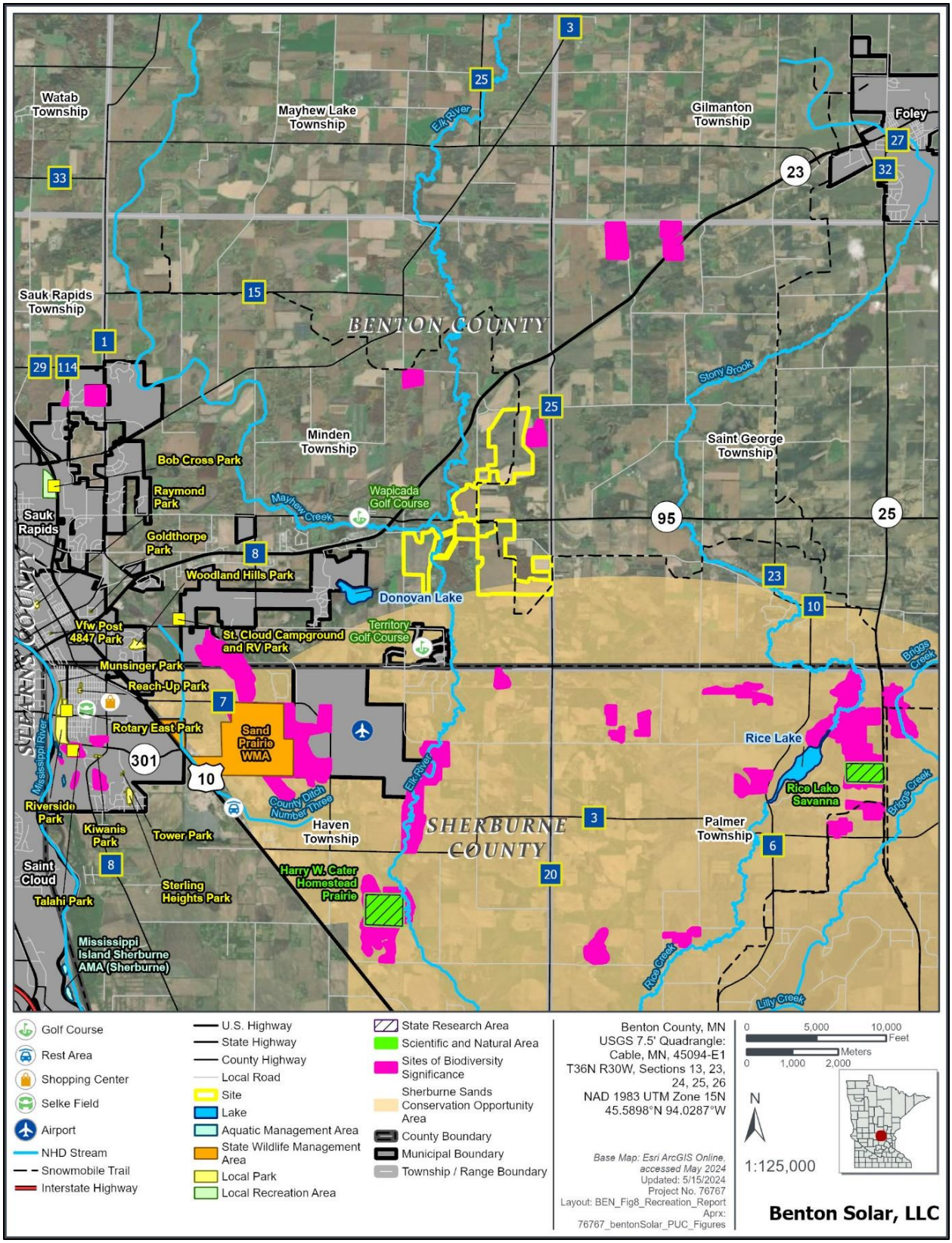

Figure 7. Recreation.

Recreational opportunities in Benton County include outdoor activities such as snowmobiling, snowshoeing, biking, and hiking. Two recreational opportunity resources—the Elk River and Benton County Trail No. 87—are present within the Site and Preliminary Development Area.

Local snowmobile clubs receive verbal permission from private landowners to use their lands for trail access. Benton County trails are mapped by MDNR and managed locally by the county and its snowmobile clubs. One Benton County trail (No. 87) travels through the central portion of the Preliminary Development Area in a north-south direction in the northern portion of the Project.

The Elk River intersects the western portion of the Preliminary Development Area in a north-south direction. The preliminary site plan indicates that collection lines will need to cross the Elk River. In this area, Benton Solar will accomplish construction through horizontal directional drilling (HDD) beneath the riverbed rather than trenching to avoid disturbance to the Elk River's bed and banks.

4.2.8.2 IMPACTS AND MITIGATION

Construction of the Project may temporarily impact recreational opportunities. The HDD boring under the Elk River could potentially cause users to avoid that section of the Elk River during construction activity. However, these impacts would be short-term, and users are expected to resume normal use following completion of these discrete construction events. The Project is not expected to be visible to users on the Elk River during the majority of the year due to forested land cover that exists between the river and the Project. If the Project is visible (e.g., in winter) to users, visibility is not anticipated to negatively impact the overall user experience.

Benton Solar would work with landowners and the County to reroute, as feasible and to circumvent the Site, the portion of Benton County Trail No. 87 that is currently within the Site. The trail would be rerouted in consideration of availability for future use and user safety. Benton Solar considered an alternative that allowed Benton County Trail No. 87 to continue to traverse through the Site, and ultimately declined the alternative due to safety concerns associated with snowmobile travel in close proximity to fencing and other Project-related infrastructure. The portion of Benton County Trail No. 87 to be rerouted would be unavailable to users during construction activity. However, these impacts would be short-term, and users are expected to resume normal use following completion of the reroute.

Benton Solar does not expect the Project to adversely impact recreational resources. Therefore, no further mitigation measures are proposed.

4.2.9 Public Services and Infrastructure

The following section provides information about existing public services and infrastructure, including public utilities and transportation in the Site, and potential Project-related impacts to these resources.

4.2.9.1 PUBLIC SERVICES

4.2.9.1.1 Existing Conditions

Public services are those services that are provided to citizens by a local, state, or federal government entity. These services are designed to support public health and safety and can include emergency services, waste and wastewater management, and communications. Public services available in Minden Township include the following:

- **Emergency services.** Providers include, but are not limited to, the Benton County Sheriff, St. Cloud fire department, Foley fire department, St. Cloud police department, Sauk Rapids police department, and the St. Cloud Hospital ambulance (Section 4.2.1).
- **Waste and wastewater management.** The majority of Minden Township uses individual septic systems or services provided by St. Cloud municipality.
- **Drinking water.** The majority of Minden Township sources drinking water through private wells.
- **Communications.** Internet and/or telephone service providers include AT&T, Verizon, Charter, Cloudnet, Duet, Exede, HughesNet, Century Link, and Integra Telecom.

4.2.9.1.2 Impacts and Mitigation

Benton Solar will coordinate with applicable public service providers as necessary and does not anticipate the Project will impact public services or their providers. Therefore, no mitigation measures are proposed.

4.2.9.2 PUBLIC UTILITIES

4.2.9.2.1 Existing Conditions

Within the Site, three existing transmission lines are present, including volt-classes of 220 to 287 and less than 100 (Figure 8). These same transmission lines are located in the Preliminary Development Area (U.S. Department of Homeland Security 2023; U.S. Energy Atlas 2021). No pipelines are located in the Site.

Utility providers within Benton County include East Central Energy, Minnesota Power, and Xcel Energy (Benton County 2023a). The utility provider in the general area where the Site is located is East Central Energy.

4.2.9.2.2 Impacts and Mitigation

Benton Solar will coordinate with necessary public utility providers and the American Land Title Association and will call Gopher 1 to identify underground utilities prior to any construction activities. Benton Solar's final Project design will minimize or avoid any impacts to underground utilities. In the event that an impact is unavoidable, Benton Solar will coordinate with the affected utility to reroute or protect the utility, as necessary. Because all underground utilities within the Site will be marked before the start of construction activities, no impacts to this resource is expected. Therefore, no mitigation measures are proposed.

4.2.9.3 TRANSPORTATION

4.2.9.3.1 Existing Conditions

Transportation resources within and near the Site include the following as depicted in Figure 8:

- **SH 95** is located in the center of the Site and runs east-west;
- **CH 25 (75th Avenue NE)** is located on the eastern edge of the Site and runs north-south;
- **CH 50 (30th Street NE)** is located in the northern portion of the Site and runs east-west;
- **CH 48 (Duelm Road NE)** is located in the southeastern portion of the Site and runs northwest-southeast;
- **65th Avenue NE** is located in the northern portion of the Site and predominantly runs north-south;
- **55th Avenue NE** is located on the western edge of the Site and runs north-south;
- **13th Street NE** is located in the southwestern portion of the Site and runs east-west; and
- **2nd Street SE** is located on the southwestern edge of the Site and runs east-west.

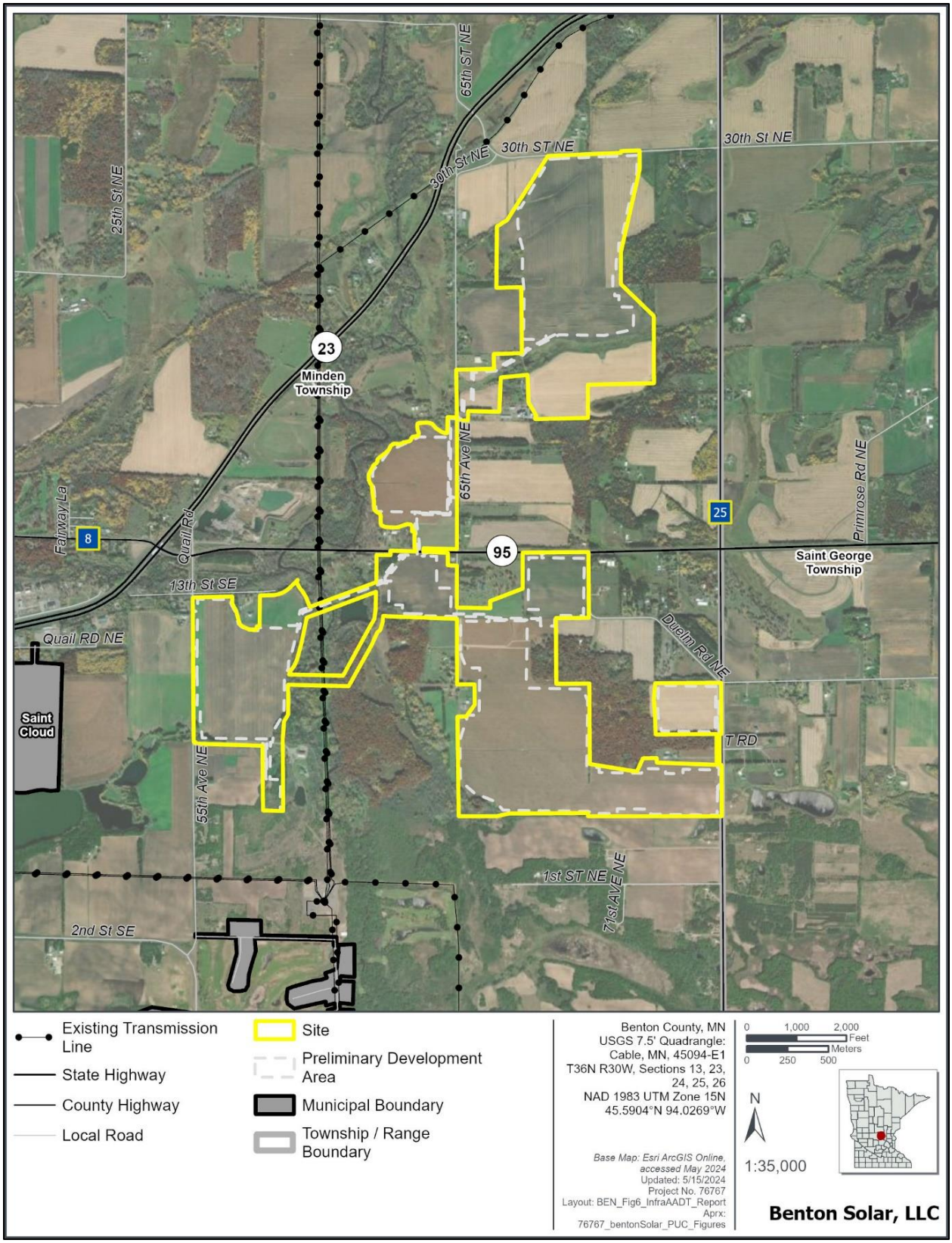

Figure 8. Existing infrastructure.

The closest active railroad track to the Site is owned by the BNSF Railway. It is located 3.9 miles southwest of the Site and runs northwest-southeast through St. Cloud (MnDOT 2023a). Figure 8 presents existing transportation resources in the Site, and Table 4.2-10 presents available annual average daily traffic data for roadways that occur in the Site.

Table 4.2-10. Transportation Resources and Annual Average Daily Traffic in the Project Vicinity

Roadway	Year	Average Annual Daily Traffic Volume Tool
SH 95	2019	5,500
CH 25 (75th Avenue NE)	2019	578
CH 50 (30th Street NE)	2015	60
CH 48 (Duelm Road NE)	2019	145

Source: MnDOT (2022).

Upon completion of Project construction, there will be 12 access roads to the Site. Access points include two access points from CH 50 (30th Street NE), two access points from 65th Avenue NE, two access points from SH 95, two access points from CH 25 (75th Avenue NE), and two access points from 55th Avenue NE. Additionally, there will be one access point to the substation.

Airports closest to the Project are St. Cloud Regional Airport (1.8 miles southwest of the Site) and Leaders Clear Lake Airport (8.9 miles south of the Site). No private air strips were identified within 5.0 miles of the Site.

4.2.9.3.2 Impacts and Mitigation

Construction-related impacts to transportation resources may include increased traffic load on roadways during construction. Construction traffic will primarily use the highway and local and county roadway systems to access and deliver materials to the Site. Benton Solar will follow all conditions of County Road Use Agreements and Benton County Haul Road permits, as applicable. The anticipated influx of construction traffic is estimated to be 20 to 30 loaded truck trips per day during construction. The average number of construction personnel on-site per day would be 150 personnel, with a maximum of 300 personnel for peak construction periods. Materials will primarily be delivered via semi-truck, and there is no anticipated use of oversized loads. Should the use of oversized loads be required for any material delivery, Benton Solar will coordinate with the appropriate agencies to obtain approvals prior to construction. Local roadways that will be used by construction traffic have average annual daily traffic below 5,000 vehicles, which is the functional capacity of two-lane paved rural highways. The increase of traffic during Project construction may be perceivable to local residents but is not anticipated to impact daily traffic function. Like the movement of farm equipment in rural areas, construction traffic may at times cause slow traffic, which will be minimal due to the short construction delivery period. The potential impact of increased traffic loads on local roads, or of potential slow-downs, will be short-term and intermittent.

Upon completion of the Project, a small O&M crew of up to three people will regularly travel through the area to monitor and maintain the Facilities. Traffic function will not be impacted as a result of O&M activities.

4.2.10 Land Use and Zoning

4.2.10.1 LAND COVER

The Project is located in a primarily agricultural and rural community setting (see Figure 9). The primary mapped land cover within the Site is cultivated crops (88.1%), followed by hay/pasture (4.5%) and deciduous forest (3.6%). Each of the remaining mapped land cover types in the Site comprises 1.4% or less of the total area. The primary land cover type within the Preliminary Development Area is cultivated crops (97.3%). Figure 9 and Table 4.2-11 present land use within the Site and Preliminary Development Area (USGS 2021). No residences are present within the Site and the Project would not cause displacement or relocation (see Section 4.2.2).

Table 4.2-11. National Land Cover Data for the Site and Preliminary Development Area

Land Cover Type	Area (acreage) within the Site	Percentage of Total Acreage within the Site	Area (acreage) within the Preliminary Development Area	Percentage of Total Acreage within the Preliminary Development Area
Cultivated Crops	838.1	88.1%	614.5	97.3%
Hay/Pasture	43.1	4.5%	10.0	1.6%
Deciduous Forest	34.5	3.6%	4.6	0.7%
Developed, Low Intensity	13.3	1.4%	1.3	0.2%
Developed, Open Space	9.1	1.0%	0.6	0.1%
Emergent Herbaceous Wetlands	4.5	0.5%	0.4	0.1%
Woody Wetlands	3.7	0.4%	0.0	0.0%
Mixed Forest	1.6	0.2%	0.1	0.0%
Developed, Medium Intensity	1.5	0.2%	0.1	0.0%
Evergreen Forest	1.3	0.1%	0.3	0.0%
Herbaceous	0.3	0.0%	0.0	0.0%
Developed, High Intensity	0.2	0.0%	0.0	0.0%
Total	**951.4**	**100.0%**	**631.9**	**100.0%**

Source: USGS (2021).
*Totals may be off slightly due to rounding.

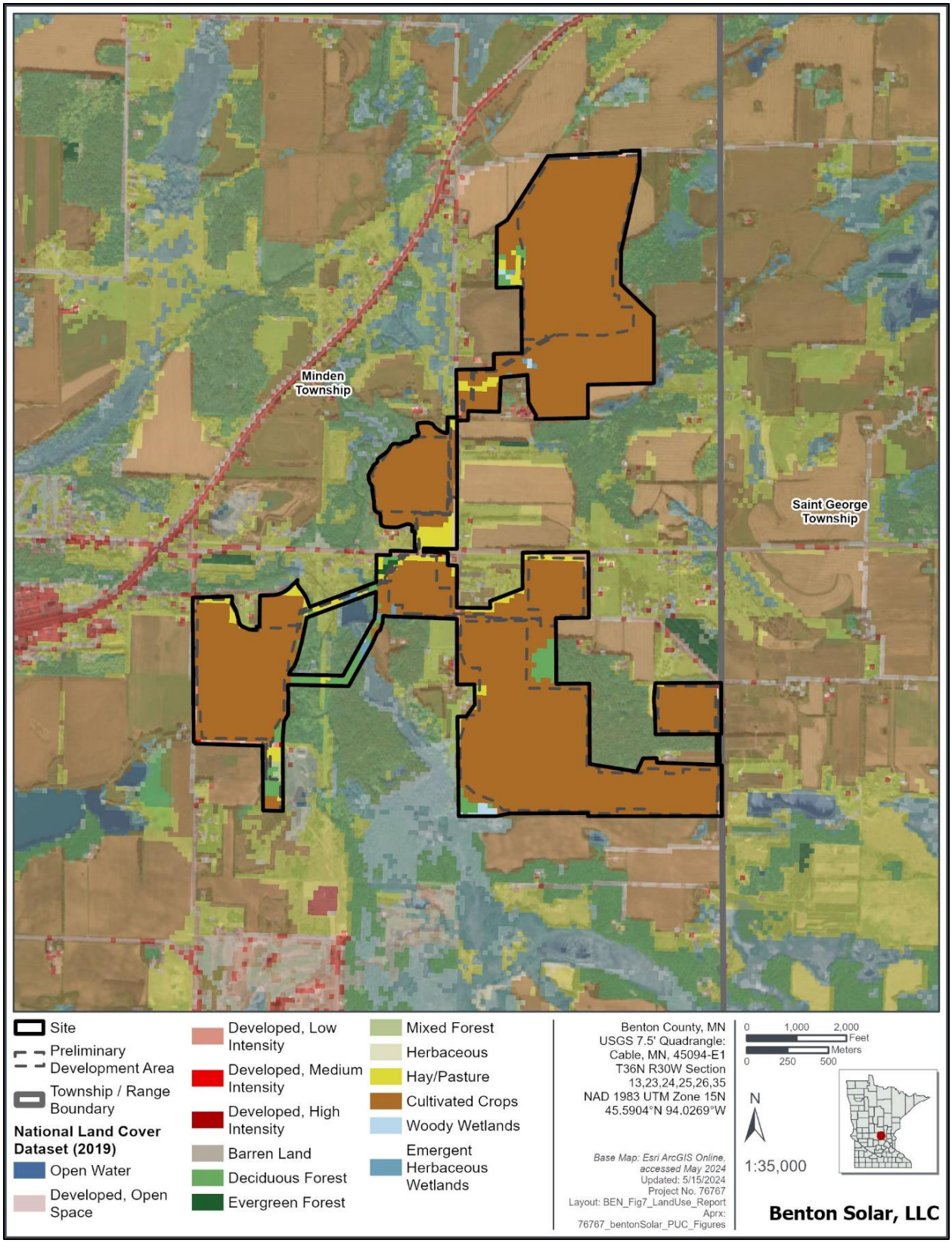

Figure 9. Land cover.

4.2.10.2 ZONING

Based on available zoning data for Benton County, the majority of the Site is zoned as agriculture (Beacon 2023) (Figure 10). The Benton County 2040 Comprehensive Plan encourages businesses and residents to utilize clean energy, including solar power, in permitted areas (Benton County 2019:44). Further, Solar Energy Systems Ordinance Number 455, located in Benton County Development Code Section 9.20, regulates (e.g., establishes standards for foundations, setbacks, maximum height, and screenings) the installation of solar farms not otherwise subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act (Minn. Stat. Chapter 216E). Because the Project is subject to siting and oversight by the State of Minnesota under the Minnesota Power Plant Siting Act, the Site Permit will serve as the land use permit. Nonetheless, the Project will adhere to the county-administered setback (see Section 3.3).

A portion of the Site is also located in the city of St. Cloud's Minden Township Orderly Annexation Area. The current zoning for the portion of the Site located in the Annexation Area is Agriculture. The long-term vision for the portion of the Site located in the Annexation Area is Office/Business Park and Low Density Mixed Residential land uses per the Minden/St. Cloud Orderly Annexation Planning Board's adopted 2003 land use master plan (City of St. Cloud 2003).

4.2.10.3 IMPACTS AND MITIGATION

The Project is compatible with long-term Benton County and City of St. Cloud land use and is not anticipated to result in impacts to the land surrounding the Site, including agricultural operations.

Construction of the Project will result in short-term disturbances to soil and vegetation and increased traffic and sound on local roads. Short-term impacts to traffic (see Section 4.2.9.3), sound (see Section 4.2.3) and air quality (see Section 4.5.1) related to construction activity are anticipated. Following completion of construction, traffic, sound, and air quality are expected to return to preconstruction levels. Project O&M is not expected to adversely impact rural lifestyles or create hardships for rural residents.

Land within the Site and Preliminary Development Area is primarily used for cultivated crops (88.1% and 97.3%, respectively) (see Table 4.2-11 and Figure 9). All cultivated cropland within the Preliminary Development Area would be taken out of production for the duration of the Project (25–30 years). As described in Appendix D, the majority of the Preliminary Development Area would be planted with the array and buffer seed mixes. Cropland production in portions of the Site outside the Preliminary Development Area (223.6 acres, or 26.7% of cultivated cropland within the Site) may continue during the life of the Project.

Because agricultural land will be impacted by the Project, Benton Solar coordinated with the MDA on development of a Project AIMP (see Appendix C). The AIMP incorporates BMPs into all phases of the Project from Site preparation through decommissioning and restoration. These BMPs are intended to avoid and minimize impacts to soil and Site productivity such that preconstruction agricultural productivity may be returned to the Site following decommissioning.

Due to implementation of the AIMP, Benton Solar anticipates that the only agricultural impact is that the land within the Site will not be farmed for the life of the permit. As discussed in Section 4.3.1, 194,832.0 acres of the total 264,320.0 acres in Benton County are considered cropland (73.7%). Conversion of 614.5 acres of cropland would reduce the amount of available cropland in Benton County by 0.3%. Upon Project decommissioning, Benton Solar will restore the Site to approximate preconstruction conditions to the extent possible in coordination with landowners. Landowners may require the Site be returned to agricultural production or may retain restored vegetation as agreed between the landowner and Benton Solar. In addition, Benton Solar will make payments to landowners that would replace revenue that would have been generated if agricultural production continued within the Site.

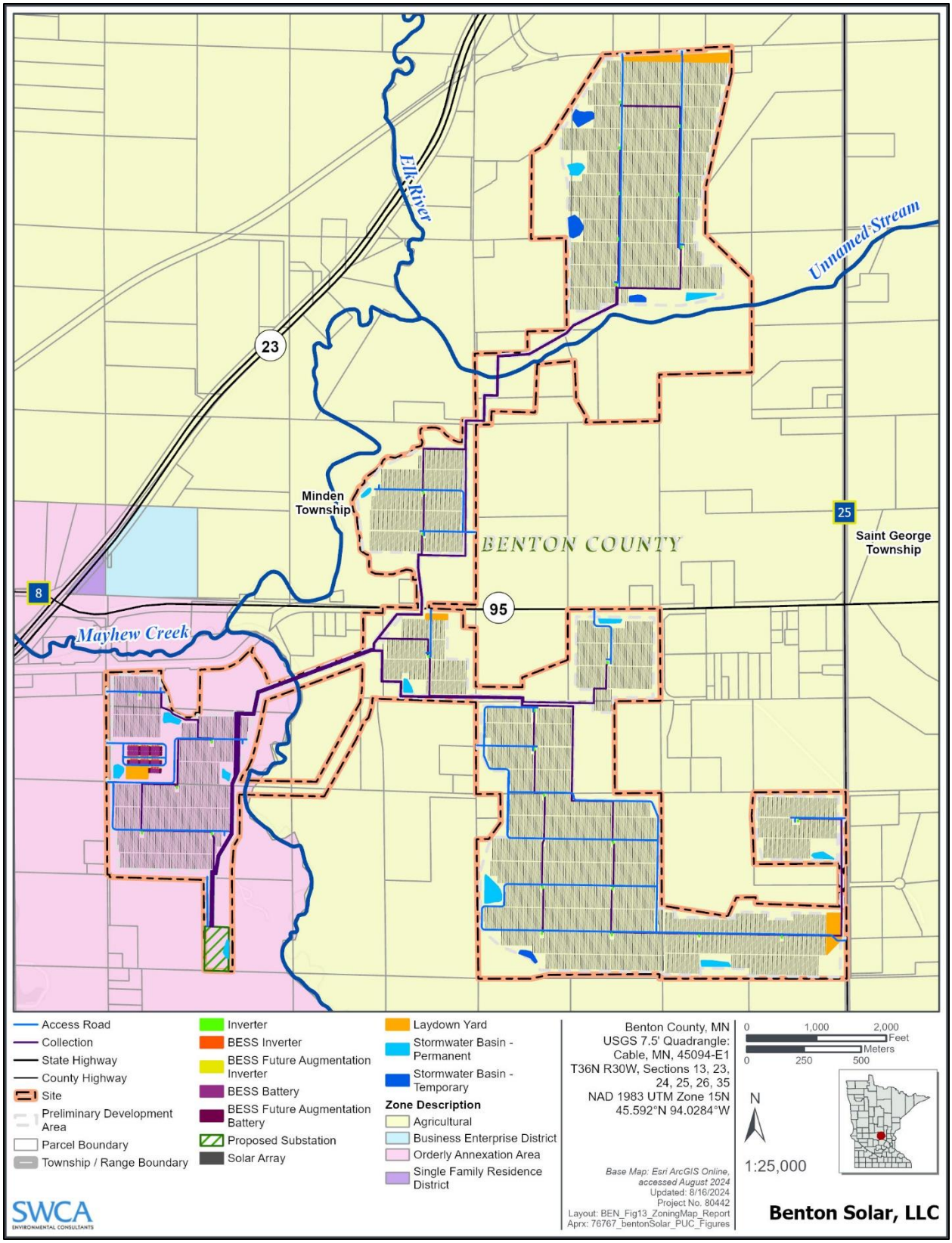

Figure 10. Zoning.

4.3 Land-based Economies

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

4.3.1 Agricultural

4.3.1.1 EXISTING CONDITIONS

According to the U.S. Department of Agriculture (USDA) 2017 Census of Agriculture, Benton County encompasses 264,320.0 acres. Farmland, which is land used either for crop or livestock production, comprises 194,832.0 of those acres. There are 816 farms averaging 239.0 acres each in Benton County (USDA 2017). Major harvested crops include corn, soybeans, vegetables harvested for sale, and forage (e.g., hay and haylage, grass silage, and greenchop). Major livestock inventories include poultry, cattle and calves (beef and milk), and hogs and pigs (USDA 2017).

Benton County's market value of agricultural products sold in 2017 was $207 million (USDA 2017). Crop sales, including nursery and greenhouse crops, accounted for 31% of the total value of sales by commodity or commodity group within Benton County (USDA 2017). Livestock and poultry product sales accounted for the remaining 69% (USDA 2017).

The use of feedlots is a common practice in raising livestock in the State of Minnesota. The MPCA administers rules regulating livestock feedlots in Minnesota. The MPCA's What's in My Neighborhood database shows that no feedlots are located within the Site (MPCA 2023b).

4.3.1.2 IMPACTS AND MITIGATION

The Preliminary Development Area includes 614.5 acres of agricultural land classified as cultivated crops (see Section 4.2.10, Table 4.2-11, and Figure 9). Approximately 10.5 acres (1.7%) are classified as prime farmland and prime farmland if drained (see Section 2.3.2, Table 2.3-1, and Figure 12). These acres will be taken out of agricultural production and the majority of the area will be planted with the array seed mix described in Appendix D. This would reduce the amount of available cropland in Benton County by 0.3% during the life of the Project. Therefore, the Project will not result in significant impacts to agricultural-based economies within the county.

Additionally, removal of land from intensive agricultural practices (e.g., tilling, pesticide application, monocultural cropping) will allow soil resources to rest and regenerate to a more productive state (U.S. Department of Energy 2023). The cessation of agricultural practices on 614.5 acres, and the subsequent establishment of regionally appropriate vegetation (through installation of the array mix), will improve soil resources by: 1) reducing tilling activity that destroys vital soil structure; 2) improving soil organic matter content through allowing robust root development; and 3) enhancing soil microorganism and fauna populations following years of intensive tillage, compaction, and pesticide and fertilizer use. For the life of the Project, agricultural production could continue unimpeded outside the Site. Leases and purchased options for landowners will offset potential revenue lost from alteration or utilization of land previously used for cropland production (Section 4.2.10.3). Following completion of Project construction, areas of temporary disturbance will be restored to preconstruction conditions or revegetated per the VMP (see Section 3.4.6). Restoration practices will ensure that land surfaces drain properly, blend with the natural terrain, are revegetated, and avoid erosion (see Section 3.4.6 and Appendix C). Upon Project decommissioning, Benton Solar will restore the Site to approximate preconstruction conditions to the extent possible, which at that time may include returning land to agricultural production as determined in coordination with landowners.

No feedlots are located in the Preliminary Development Area (MPCA 2023b). Therefore, no impacts to feedlots will occur.

Additional details regarding prime farmland and the prime farmland exclusion rule are provided in Section 2.3.

4.3.2 Forestry

4.3.2.1 EXISTING CONDITIONS

The Site includes 34.5 acres of deciduous forest, 1.6 acres of mixed forest, and 1.3 acres of evergreen forest. Within the Preliminary Development Area, there are 4.6 acres of deciduous forest, 0.1 acre of mixed forest, and 0.3 acre of evergreen forest. Tree cover within the Site is primarily forest remnants, particularly associated with the Elk River. Further information on land cover types within the Site is presented in Section 4.2.10 and Figure 9.

4.3.2.2 IMPACTS AND MITIGATION

Benton Solar has sited the Project to avoid the need to clear trees to the maximum extent possible. Up to 10.1 acres of forested land cover will be removed within the Site to accommodate construction of the Project substation, to establish HDD boring entry points and access to those entry points, and to address shading concerns. In most areas, forest remnants have been avoided (see Figure 3). Therefore, Benton Solar does not anticipate impacts to forestry resources, and mitigation measures are not proposed.

4.3.3 Tourism

4.3.3.1 EXISTING CONDITIONS

Tourism attractions in Benton County include those found in St. Cloud and Sauk Rapids. St. Cloud (4.0 miles west of the Site) is home to 94 public parks and 25.0 miles of trails that offer year-round recreation (City of St. Cloud 2023). Parks include the Sand Prairie Wildlife Management and Environmental Education Area located near the southeastern edge of St. Cloud. This park includes 700 acres, two wetland restoration areas, restored prairie, native brushland, woods, and a variety of wildlife (Explore Minnesota 2023). St. Cloud also is home to the Territory Golf Club and the Wapicada Golf Club, located outside the Site. The Wapicada Golf Club has a variety of golf leagues and an event venue (Wapicada Golf Club 2023).

The Minnesota Baseball Hall of Fame Museum is located within the St. Cloud city center. St. Cloud is also home to the Stearns History Museum, which was founded in 1936 and hosts approximately 12,000 visitors annually. The museum rotates exhibits from its in-house archives, local donors, and traveling exhibits. East of the Stearns History Museum is the Munsinger Clemens Gardens, which includes two adjacent gardens offering more than 20 acres of informal and formal gardens and walking paths (Munsinger Clemens Botanical Society 2023).

The downtown portion of the City of Sauk Rapids is located 6.0 miles west of the Site. Sauk Rapids hosts the Benton County Fair for 1 week during summer. The fair includes live music, agricultural exhibits, livestock competitions, auctions, and other family-friendly activities (Benton County Fair 2023). Granite City Motor Park (also known as Granite City Speedway) is also located in Sauk Rapids. Six racing divisions occur weekly from May to Labor Day, and several special events take place throughout the year (Visit St. Cloud 2023).

Unincorporated Benton County includes seven parks totaling 354 acres with frontage on the Mississippi River and access to Little Rock Lake (City of St. Cloud 2023).

4.3.3.2 IMPACTS AND MITIGATION

The aforementioned major tourist attractions are located outside the Site. Construction and operation of the Project will not impede or prevent access to tourist attractions. The Applicant does not anticipate any impacts to tourist attractions from the Project; therefore, no mitigation measures are proposed.

4.3.4 Mining

4.3.4.1 EXISTING CONDITIONS

According to MnDOT's Aggregate Source Information System and County Pit Map for Benton County, the following occur in Benton County: 25 commercial aggregate sources, one rock quarry, 11 inactive aggregate sources, 22 aggregate pits (prospected), one commercial aggregate source (prospected), and one MnDOT-owned aggregate source. None of these sources is located within the Site (MnDOT 2003, 2023b).

4.3.4.2 IMPACTS AND MITIGATION

The Applicant expects the Project will have no impacts to active or inactive mines. Therefore, no mitigation measures are proposed.

4.4 Archaeological and Historical Resources

SWCA Environmental Consultants (SWCA) conducted a Phase Ia cultural resources literature review encompassing the Site and a 1.0-mile study area around the Site. This 1.0-mile study area was included to provide a review of sites and archaeological work in the Project vicinity to satisfy Minnesota State Historic Preservation Office (SHPO) guidelines. The results of this literature review are summarized below and fully detailed in Appendix I1. SWCA also conducted a Phase 1 cultural resources survey of the Site (Appendix I2). The surveys began in fall of 2022 and concluded in spring of 2024. The Phase I cultural resources report has been reviewed and the recommendations contained therein have been accepted by the SHPO (Appendix I2-1).

In addition, Benton Solar conducted outreach to 47 Native American Tribes, including the 11 Minnesota Tribal Nations, for the Project. Initial outreach consisted of a letter sent on October 24, 2022, providing information on the Project and surrounding area. Details of tribal coordination efforts are presented in Section 5 and Appendix I3. As a result of the tribal outreach mentioned above, tribal cultural specialists from the Standing Rock Sioux Tribe, the Mille Lacs Band of Chippewa, the Rosebud Sioux Tribe, the Sisseton Wahpeton Oyate, and the Upper Sioux Community have attended survey efforts completed to date. During the surveys, five tribal resources were identified, and Benton Solar is working with the Tribes to identify and implement suitable avoidance measures.

4.4.1 Phase Ia Literature Review

In October 2022, SWCA conducted a literature review for information regarding the nature and location of previously conducted archaeological surveys, previously recorded cultural resources sites, and National Register of Historic Places (NRHP)–listed districts and properties within the Site and the 1.0-mile study area around the Site. The literature review covered information on archaeological resources, traditional cultural properties, NRHP-listed resources, and other cultural resources documented within the study area.

To conduct the literature review, SWCA coordinated with the SHPO to perform a search of records for previously recorded cultural resources sites, previously conducted surveys, and NRHP districts and properties within the area. Additionally, SWCA reviewed records held by the Minnesota Office of the State Archaeologist via the agency's online portal and reviewed other publicly available historical records.

The literature review revealed that no archaeological sites were documented in the Site, but one historic highway was documented in the Site. The historic highway bisects the Site, with a collection line crossing in one location. Additionally, four archaeological sites, five historic building sites, three historic bridges, and one historic highway have been documented within 1.0 mile of the Site. These sites are unevaluated or recommended not eligible for the NRHP. The search also indicated that there are no cultural resources listed on the Minnesota State Historic Sites Network, the Minnesota State Register of Historic Places, or the NRHP within the Site or study area. Further description of these sites is included in Appendix I1.

Notably, the St. Patrick's Catholic Church cemetery is adjacent to the Site. No Project use would occur within the cemetery or known burial locations, and no Facilities will be sited within 100.0 feet of the cemetery. Cemeteries/burials are subject to avoidance by the Project pursuant to Minn. Stat. § 307.08, which prohibits the molestation of human remains, burials, and cemeteries. The Project and Project personnel will comply with this law.

4.4.2 Impacts and Mitigation

The Project will avoid impacts to identified eligible and potentially eligible cultural resources, as summarized within the Phase Ia report. All unevaluated, not eligible, and other historic sites will also be avoided by Project design. A Phase I survey has been completed to facilitate resource avoidance. A Phase I cultural resources report has also been reviewed, and the recommendations contained therein have been accepted by the SHPO (Appendices I2 and I2-1). In addition, an unanticipated discovery plan will be drafted and put in place to assist in the identification, evaluation, and avoidance of any significant cultural resources that might be discovered during construction or operation of the Project. Due to avoidance of all known sites, no impacts to archaeological and historical resources are expected.

4.5 Natural Environment

4.5.1 Air Quality

4.5.1.1 EXISTING CONDITIONS

The Clean Air Act of 1970, 42 United States Code 7401 et seq., amended in 1977 and 1990, is the primary federal statute governing ambient air pollution. The Clean Air Act designates standards for the following criteria pollutants that have been determined to affect human health and the environment: particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Volatile organic compounds and NO_2 are precursors to O_3, which is not an emitted source but is formed by these pollutants in the atmosphere (40 CFR 50). The EPA has developed National Ambient Air Quality Standards (NAAQS) for these criteria pollutants to protect public health and welfare. The State of Minnesota follows ambient air quality goals and standards as defined under Minn. R. 7009.0080. The Clean Air Act requires the EPA to set NAAQS to protect health, the environment, and property (40 CFR 50). There are six NAAQS criteria air 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) (EPA 2022a). To ensure compliance with the NAAQS, the MPCA tracks air quality using Ambient Air Quality Monitoring Sites located throughout the state (MPCA 2022a). The State of Minnesota met NAAQS for all criteria pollutants in 2022 (MPCA 2022b). The MPCA has also established state standards (Minnesota Ambient Air Quality

Standards) for hydrogen sulfide (H_2S) and particulate matter (Minn. R. 7009.0080; Revisor of Statutes, State of Minnesota 2017). The MPCA is responsible for compliance with state and federal standards for air quality in Minnesota.

The Air Quality Index (AQI) was developed by the EPA to provide a simple, uniform way to report daily air quality conditions (AirNow 2021). Minnesota AQI numbers are determined by hourly measurements of five pollutants. The pollutant with the highest AQI value determines the overall AQI for that hour (MPCA 2020a). These five pollutants include:

- Fine particulate matter ($PM_{2.5}$);
- Ground-level ozone (O_3);
- Sulfur dioxide (SO_2);
- Nitrogen dioxide (NO_2); and
- Carbon monoxide (CO).

Many factors can lead to poor air quality days. Air pollution levels in Minnesota come from local pollutant emissions generated from sources such as industries, cars, and homes and from pollution that is blown into Minnesota from surrounding areas (MPCA 2020a). The MPCA monitors outdoor air quality at over 50 air quality monitoring stations that are dispersed across the state. Collected data are used to determine whether Minnesota meets the federal and state air quality standards and health benchmarks (MPCA 2020b). The MPCA ranks air quality breakpoints based on the reported levels of indicators and places them into one of five narrative categories: good, moderate, unhealthy for sensitive groups, unhealthy, and very unhealthy (MPCA 2020a).

The nearest Ambient Air Quality Monitoring Site is in St. Cloud, 4.3 miles southwest of the Site (MPCA 2022a). This site monitors O_3 and $PM_{2.5}$. Table 4.5-1 provides the AQI in St. Cloud for the past 6 years reported (MPCA 2022b). The air quality was considered good for the majority (88.4%) of time from 2016 to 2021, based on the EPA's standards.

There are limited air pollutant emissions within the Site. The primary emission sources within the Site currently include agriculture-related equipment and vehicles traveling along state highways or county roads.

Table 4.5-1. Days in Each Air Quality Index Category, St. Cloud, Minnesota

Air Quality Index	Good		Moderate		Unhealthy for Sensitive Groups		Unhealthy or Very Unhealthy		Total Days
Year	Number of Days	Percent of Days	Number of Days	Percent of Days	Number of Days	Percent of Days	Number of Days	Percent of Days	
2016*	338	92.4%	28	7.7%	0	0.0%	0	0.0%	366
2017	329	90.1%	36	9.9%	0	0.0%	0	0.0%	365
2018	310	84.9%	54	14.8%	1	0.3%	0	0.0%	365
2019	313	91.0%	31	9.0%	0	0.0%	0	0.0%	344
2020*	336	91.8%	30	8.2%	0	0.3%	0	0.0%	366
2021	290	80.3%	66	18.3%	3	0.8%	2	0.6%	361
Total/ Average	**1,916**	**88.4%**	**245**	**11.3%**	**4**	**0.2%**	**2**	**0.1%**	**2,167**

Note: Total days may not equal 365 and rather reflect all days for which data were available. Categories are as defined by the MPCA (2022b).
* Leap year

4.5.1.2 IMPACTS AND MITIGATION

Project construction activities (e.g., clearing, grading, and hauling) may result in the short-term increase of: 1) airborne dust/particulate matter; and 2) emissions related to operation of construction equipment and vehicles. No long-term impacts to air quality are anticipated to result from Project construction activities. Short-term impacts during construction are expected to be localized and would not impact the surrounding area. Airborne mobilization of dust particles constitutes wind erosion. Measures to minimize and mitigate potential wind erosion, such as dust suppression/control and reclamation during and after construction, will be addressed in the Applicant's Project-specific SWPPP that will be implemented during Project construction. Applicable BMPs may also be included in Benton County Haul Road permits, if applicable. The Applicant will maintain equipment and vehicles in good working condition through routine maintenance checks to minimize emissions.

Project O&M activities may result in intermittent and short-term increases in airborne dust/particulate matter due to the use of equipment or vehicles in graveled or unprotected soil areas. The increase in emissions from vehicles and construction equipment is expected to be negligible as there are several well-traveled roadways, such as SH 95, in the area. No adverse impacts to air quality related to Project O&M are anticipated. Overall, operation of the Project is expected to have a beneficial impact to air quality by reducing: 1) emissions that would take place on an annual basis from burning of fossil fuels related to farming practices; and 2) wind erosion and airborne dust/particulate matter associated with agriculture cultivation equipment.

4.5.2 Climate Change

Climate change is defined as a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates (National Aeronautics and Space Administration 2024). Scientists predict that climate change will contribute to rising temperatures, increased variability of weather patterns, and increased intensity of severe weather events.

The State of Minnesota has taken several actions to address concerns related to climate change:

- 2007. Minnesota enacted The Next Generation Energy Act (2007) which requires the state to reduce greenhouse gas emissions by 80% between 2005 and 2050. Provisional goals of a 15% reduction by 2015 and 30% by 2025 were also established. Minnesota did not meet the 2015 goal, and the state has since bolstered its efforts by supporting energy efficiency, clean energy, and supplementation of other renewable energy standards (MPCA 2023c).
- 2019. Minnesota Governor Tim Walz signed Executive Order 19-37, which established the Climate Change Subcabinet and Governor's Advisory Council on Climate Change to promote coordinated climate change mitigation and resilience strategies in Minnesota. According to Executive Order 19-37, climate change is a threat that impacts all Minnesotans, presents a "complex problem," and its "impacts are disproportionally borne by disadvantaged communities." Furthermore, Executive Order 19-37 states that "disparities can be exacerbated by policies that do not reflect considerations of equity."
- 2022. Minnesota's Climate Change Subcabinet published Minnesota's Climate Action Framework that set targets to reduce emissions 50% by 2030 (from 2005 levels), achieve 100% carbon-free electricity and 55% renewable electricity in the state by 2040, expand use of carbon-free electricity, and achieve net-zero emissions by 2050 (State of Minnesota 2022). These targets were adopted into statute in 2023. The 2023-2027 One Minnesota Greenhouse Gas Emissions Goal aligns with these more ambitious targets for emissions reductions.

- 2023. Minnesota enacted Laws of Minnesota 2023, chapter 7, that amends Minn. Stat. 216B.1691 and advances several priority actions identified in the Climate Action Framework and implements an aggressive timeline for use of renewable sources for retail electrical sales. The standard mandates carbon-free electrical generation for 80% of the retail market by 2030, 90% by 2035, and 100% by 2040. Furthermore, Minn. Stat. 216B.1691, subd. 2f sets a goal that 10% of retail electrical sales by 2030 will be from solar energy generation. The intent of this mandate is to reduce GHG emissions that could otherwise accelerate climate change.

This section evaluates: 1) how the Project may affect climate change; 2) the climatological conditions that may prevail near the Project over the relevant timeframe; 3) how climate change may affect the Project; and 4) how climate change may act to exacerbate or mitigate Project-related impacts. A discussion of GHG emissions in the Site, and potential Project impacts related to GHG emissions, is also included.

4.5.2.1 EXISTING CONDITIONS

While the Project may put downward pressure on future climate change, it is expected that climate conditions near the end of the Project's lifespan will differ from the conditions that prevail today.

- The MDNR reports that between 1895 and 2023, the average annual temperature in the state rose at a rate of 0.24 degrees Fahrenheit (°F)[5] per decade (MDNR 2024a). Using the Mississippi River – St. Cloud watershed as a geographic unit representative of the Site, the temperatures rose at a higher rate (0.26°F per decade) within the Site relative to the state average. From 2014 to 2023, the average annual temperature within the Site was 43.75°F.[6] If the rate of temperature increase is constant, the average temperature within the Site is expected to increase by 0.78°F to 44.53°F by the year 2053.
- The MDNR reports that average annual precipitation in the Site from 2014 to 2023 was 30.12 inches (MDNR 2024a). From 1895 to 2023, average annual precipitation increased at a rate of 0.43 inch per decade. Therefore, the average annual precipitation within the Site is expected to increase by 1.29 inches to 31.41 inches by the year 2053.
- Minnesota currently receives hail at a moderate frequency (National Oceanic and Atmospheric Administration 2024) and, on rare occasions, severe weather in Minnesota can produce hail large enough that it has potential to damage PV arrays (Minnesota Public Radio 2023).
- The Palmer Drought Severity Index (PDSI) is a dryness metric that combines temperature and precipitation data (Dai et al. 2023). It ranges from -10 (dry) to 10 (wet). The MDNR reports that average annual PDSI in the Site from 2014 to 2023 was 1.55 (MDNR 2024a). From 1895 to 2023, average annual PDSI increased at a rate of 0.20 per decade. Therefore, the average annual PDSI within the Site is expected to increase by 0.60 to 2.75 by the year 2053.

In summary, it is likely that the climate in the Site and within the vicinity of the Site will be somewhat warmer and wetter in the future than it is currently, and that the intensity of severe weather events will increase.

[5] Measurements included in Section 4.5.2 are from cited sources and therefore are retained to the decimal place in the cited source.

[6] 43.75°F is the 10-year average of in-sample predictions from a linear regression of average annual temperature per year from 1895 to 2023, as reported by the MDNR Minnesota Climate Trends tool (MDNR 2024a). The actual average temperature from 2014 to 2023 is calculated as 43.79°F.

4.5.2.2 IMPACTS AND MITIGATION

4.5.2.2.1 Effects of Climate Change on the Project

Weather events that produce hail represent the greatest weather-related risk to solar PV systems (Federal Energy Management Program 2024). PV modules can generally withstand exposure to small-sized hail, but very large hail (i.e., greater than 1.75 inches in diameter) can cause significant damage. Benton Solar will minimize potential damage from severe storms to the extent practicable by selecting a PV manufacturer from a list of Tier 1 suppliers. Tier 1 suppliers use high-quality, weather-resistant materials that have demonstrated resistance to severe weather events, including hail-producing storms (Consumer Affairs 2023).

Further, increased precipitation and weather event intensity could elevate the risk of damage to Facilities located in floodplains or other low-lying areas. However, the Preliminary Development Area and preliminary site plan intentionally avoid such areas to the extent feasible. The only Facilities that intersect floodplains are electrical collection lines, which will be underground. As a result, no Facilities are likely to be affected by a change in future flooding severity or frequency.

4.5.2.2.2 Effects of Climate Change on Project-related Impacts

This section discusses the potential effect of climate change on Project-related impacts to biophysical resources, wastewater infrastructure, and socioeconomic resources.

Biophysical Resources

Climate change is likely to increase the quantity of precipitation and severity of storms in the future. These changes can in turn result in an increase in the transport of stormwater, sediment, and nutrients to areas on or outside the Site.

To address these concerns during construction, Benton Solar will implement a SWPPP to minimize erosion and prevent sediment from entering aquatic resources. Additionally, stormwater basins will be installed to help catch and control runoff during rain events. Finally, where Facilities (e.g., electrical collection lines) intersect surface water resources, Benton Solar will accomplish construction through HDD to avoid disturbance to the resource (Section 4.5.5).

Following Project construction, Benton Solar will revegetate portions of the Site with regionally appropriate vegetation that will serve to control erosion and runoff, increase organic matter and water holding capacity of soils, and enhance ecological diversity and function (see Section 3.4.6 and Appendix D) (MDNR 2020). Therefore, relative to baseline conditions, which include agricultural fields often left bare for some portion of the year, and recognizing that more than 70% of nitrates in the state's environment comes from cropland (Section 2.4.3), the Project is expected to result in a net reduction in stormwater, sediment, and nutrient runoff following severe weather events. This, in turn, may improve the quality of proximate habitats and benefit the aquatic and terrestrial flora and fauna that inhabit those areas.

Wastewater Infrastructure

Benton Solar does not anticipate installing septic systems. Therefore, and in consideration of the preceding discussion regarding stormwater, sediment, and nutrient management, wastewater-related issues and/or interactions with the township's septic systems are not expected irrespective of climate change.

Socioeconomic Resources

This section discusses the potential effect of climate change on Project-related changes to land use, agricultural output, and critical facilities.

LAND USE AND AGRICULTURAL OUTPUT

The majority of the Preliminary Development Area (97.3%) is comprised of cropland land cover. These croplands will be taken out of production for the life of the Project. Noting that wetter future conditions may alter the yields of certain crops, climate change could exacerbate or mitigate future socioeconomic impacts brought about by the Project's utilization of current cropland acreage. However, only 0.3% of the agriculture land classified as cropland in Benton County will be occupied by the Project, and landowners will be financially compensated via purchase or lease for lost production. Successful implementation of the VMP (see Appendix D) can help increase organic matter and water holding capacity of soils, resulting in higher quality soils for farming after the Site is decommissioned (MDNR 2020). Moreover, adaptations to climate change, such as adopting alternative land management practices and switching to more resilient crops, are likely. Therefore, climate change is not expected to materially alter the Project's impacts on land use or agricultural output.

CRITICAL FACILITIES

Critical facilities in this discussion refer to built structures necessary to a community's public health and safety. Examples include hospitals, schools, nursing homes, and electric generating facilities. As outlined in the preceding sections, the Project is designed to be resilient in the face of climate change. Moreover, aside from providing electricity to the transmission and distribution networks that may power other critical facilities in the area, the Project is not expected to materially interact with any existing critical facilities. Thus, climate change is not expected to alter the Project's impacts on critical facilities.

4.5.3 Greenhouse Gas Emissions

The burning of carbon-based fuels results in greenhouse gas (GHG) emissions that exacerbate climate change. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several fluorinated species of gas. CO_2 is emitted primarily from the combustion of fossil fuels; CH_4 is emitted from the production and transport of coal, natural gas, and oil; and N_2O is emitted during agricultural and industrial activities. Fluorinated gases, which are synthetic, are emitted from a variety of industrial processes. Some GHGs, including CO_2, are also naturally occurring gases in the atmosphere. Their status as pollutants is not related to their toxicity but to the added long-term impacts on climate because of their increasing levels in the Earth's atmosphere (EPA 2022b).

The global warming potential (GWP) of gases allows comparison of global warming impacts between different gases. The GWP of a gas depends on how well the gas absorbs energy and how long the gas stays in the atmosphere. GWP is a measure of the total energy that a gas absorbs over a particular period (usually 100 years) compared with CO_2, which has a GWP of 1. The larger the GWP, the more warming the gas causes. For example, CH_4 has a 100-year GWP estimated to be 29.8, meaning that CH_4 would cause 29.8 times as much warming as an equivalent mass of CO_2 over a 100-year period (Intergovernmental Panel on Climate Change [IPCC] 2021). The GWP for N_2O is estimated to be 273.0. The term "carbon dioxide equivalent" (CO_2e) is used to describe different GHGs in a common unit. CO_2e is calculated with CO_2, CH_4, and N_2O multiplied by the 100-year GWP values from the IPCC's Sixth Assessment Report (IPCC 2021).

4.5.3.1 EXISTING CONDITIONS

The EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks provides data regarding annual GHG emissions (EPA 2022c). Table 4.5-2 provides the economic sector and total GHG emissions for the United States for 2020, the most recent available reporting year (EPA 2022d). These data are useful in understanding sources of anthropogenic emissions and how they contribute to GHG emissions nationally and within Minnesota.

Table 4.5-2. Greenhouse Gas Emissions by Sector

Sector	2020 U.S. GHG Emissions (million metric tons CO_2e)	2020 Minnesota GHG Emissions (million metric tons CO_2e)
Transportation	1,627.6	27.4
Electric power industry	1,482.2	20.2
Industry	1,426.2	28.8
Agricultural	635.1	26.9
Commercial	425.3	8.8
Residential	362.0	9.9
Total	**5,958.4**	**122.0**

Source: EPA (2022c).
Note: Does not include U.S. territories.

Nationally, transportation is the top contributor to GHG emissions, followed by the electric power industry and general industry. However, in Minnesota, the top contributors to GHG emissions are general industry, transportation, and agriculture (see Table 4.5-2). The fossil fuel combustion sectors (CO_2 and other GHGs) contributed over 96.0% of the GHG emissions from the electric power industry sector in Minnesota in 2020. Other electricity generation categories contributed 1.0% (Table 4.5-3).

Table 4.5-3. Greenhouse Gas Emissions by Electric Power Industry Sector

Sector	2020 U.S. GHG Emissions (million metric tons CO_2e)	2020 Minnesota GHG Emissions (million metric tons CO_2e)
Fossil fuel combustion: carbon dioxide	1,439.0	19.2
Fossil fuel combustion: other greenhouse gases	21.0	0.3
Incineration of waste	13.5	0.5
Other electricity generation categories	8.7	0.2
Total	**1,482.2**	**20.2**

Source: EPA (2022c).
Note: Does not include U.S. territories.

4.5.3.2 IMPACTS AND MITIGATION MEASURES

Certain Project activities will produce a *de minimis* level of GHG emissions. Project activities resulting in GHG emissions include equipment use and vegetation removal during construction, and vehicular traffic during O&M. Exact amounts of fuel consumption during construction are not known at this time. As a preliminary estimate, fuel use on a typical construction day may average 120 gallons, depending on the size and type of equipment used. The typical fuel used is a mixture of distillate No. 1 and distillate No. 2 diesel fuels (60 gallons per day of each fuel type). Project construction is anticipated to take 14 months, which includes a 16-week winter break during which construction is expected to be scaled back substantially. Assuming 40 weeks of peak construction activity and five workdays per week, total fuel consumption

would be 12,000 gallons of each fuel type. This estimate likely overestimates fuel use. Table 4.5-4 shows a preliminary estimate of the construction emission calculations for GHG emissions of CO_2, CH_4, and N_2O resulting from equipment use using EPA emissions factors (40 CFR 98, Tables C-1 and C-2). GHG construction emissions are expected to be 245.5 metric tons of CO_2e. The GHG emissions for Project O&M are estimated to be approximately 5% of construction emissions, or 12.3 metric tons (13.5 tons) of CO_2e annually. During both construction and O&M, Benton Solar will minimize GHG emissions related to equipment and vehicle use by limiting idling to only those times when necessary, using vehicles and equipment that meet air emissions standards, and performing routine maintenance to ensure vehicles and equipment remain in good, working order and operate at performance standards.

Vegetation removal during construction could also result in an increase in CO_2 through reduced respiration and CO_2 storage. In addition, soil disturbance could result in the release of CO_2 (Paustian et al. 2000). Vegetation removal and soil disturbance will largely be limited to those areas requiring grading within the Preliminary Development Area. Benton Solar will restore disturbed areas according to measures described in Section 3.4.6 and Appendix D. These measures are expected to facilitate carbon sequestration throughout the life of the Project. Additionally, Project-related vegetation removal and soil disturbance is not anticipated to extend beyond that which would result from ongoing current land use practices (i.e., agricultural).

Project-related GHG emissions are anticipated to be short-term, minor, and intermittent and are not expected to result in impacts beyond those that are likely to occur in the absence of Project development (e.g., from agriculture and traffic). Minnesota has not established specific GHG emission thresholds, but Minn. R. 4410.4300, subp. 15(B) requires the preparation of an Environmental Assessment Worksheet for stationary sources generating 100,000 tons of GHGs per year. Because the Project is well below the 100,000-ton threshold at approximately 13.5 tons per year, GHG emissions are anticipated to be negligible, and an Environmental Assessment Worksheet is not required.

The Project is expected to have an overall positive impact on GHG emission levels in the state and region as it replaces the need for a more traditional energy generation source (i.e., fossil fuel combustion) with renewable energy. The Project would further the clean energy goals set by the state and the Governor's office. By introducing 100 MW of low carbon intensity solar-generated electricity to the grid, the Project will help to decrease the carbon intensity of electricity generated in Minnesota. This will lessen both future atmospheric concentrations of GHGs and the rate of climate change.

Table 4.5-4. Preliminary Estimate of the Emission Calculations for Greenhouse Gas Emissions of CO_2, CH_4, and N_2O

Fuel Type	Estimated Total Fuel Use (gallons)	Heating Value (mmBtu/ gallon)*	CO_2 Emission Factor (kg CO_2/ mmBtu)†	Total CO_2 Emissions (kg)	CH_4 Emission Factor (kg CH_4/ mmBtu)	Total CH_4 Emissions (kg)	N_2O Emission Factor (kg N_2O/ mmBtu)	Total N_2O Emissions (kg)
Distillate No. 1	12,000	0.139	73.25	122,181.0	0.003	5.0	0.0006	1.0
Distillate No. 2	12,000	0.138	73.96	122,477.76	0.003	5.0	0.0006	0.99
Total (kg)	–	–	–	244,658.76	–	10.0	–	1.99
GWP	–	–	–	1	–	29.8	–	273.0
Total as CO_2e (kg)	**–**	**–**	**–**	**244,658.76**	**–**	**298.0**	**–**	**543.3**
Total as CO_2e (metric tons)	**–**	**–**	**–**	**244.7**	**–**	**0.3**	**–**	**0.5**

Source: 40 CFR 98, Tables C-1 and C-2.
* mmBtu = 1 million British thermal units
† kg = kilogram

4.5.4 Soils

4.5.4.1 EXISTING CONDITIONS

Soil resources within the Site were evaluated using the gridded Soil Survey Geographic database (SSURGO) (Soil Survey Staff 2023). SSURGO, developed by the NRCS for natural resources planning and management, provides digital access to original soil survey data for streamlined use on GIS platforms. SSURGO identified 34 soil map units (SMUs) within the Site (Figure 11).

Soils in the Site consist predominantly of mollisols and alfisols formed from outwash or sediments over till, alluvium (sediments deposited by running water of streams and rivers), and loess (material transported and deposited by wind and consisting of predominantly silt-sized particles) (Soil Survey Staff 2024). Soils fall into a mesic temperature regime with average soil temperatures between 46.4°F (8 degrees Celsius [°C]) and 59°F (15°C). Soil moisture regimes range from aquic (saturated long enough to cause oxygen depletion) to udic (humid or subhumid climate). Soils are generally very deep, excessively drained to very poorly drained, and sandy or loamy. Predominant soil textures consist of sandy, coarse loam, and loam. The Hubbard loamy sand and Milaca loam make up the predominant SMUs within the Site. Table 4.5-5 lists the soil types located in the Site. Additional soil characterizations are provided in Appendix C.

4.5.4.1.1 Prime Farmland Determination

Soils protected by state and federal regulation include agricultural land designated as prime or unique. These soils generate the highest yields with the least amount of expenditure. Soils currently occupying pastures and fields or otherwise undeveloped forest and open land can be classified as prime farmland soils. Prime farmland is defined as “land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion” (NRCS 1981). Lands occupied by surface water or residential, commercial, or industrial uses cannot receive this designation. Prime farmland soils generally meet the following criteria: 1) have an adequate water supply, either from precipitation or irrigation; 2) contain few or no rocks; 3) are permeable to water and air; 4) are not excessively erodible or saturated for long time periods; and 5) either do not flood frequently or are protected from flooding.

The NRCS also recognizes farmland of statewide importance, which is defined as land other than prime farmland that is used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, vegetables) (NRCS 1981). 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 2.3-1 presents the farmland classifications for the Site. Within the Site, 501.1 acres (52.6%) are not prime farmland; 435.3 acres (45.8%) are farmland of statewide importance; 9.6 acres (1.0%) are prime farmland if drained; and only 5.4 acres (0.6%) are prime farmland (Figure 12).

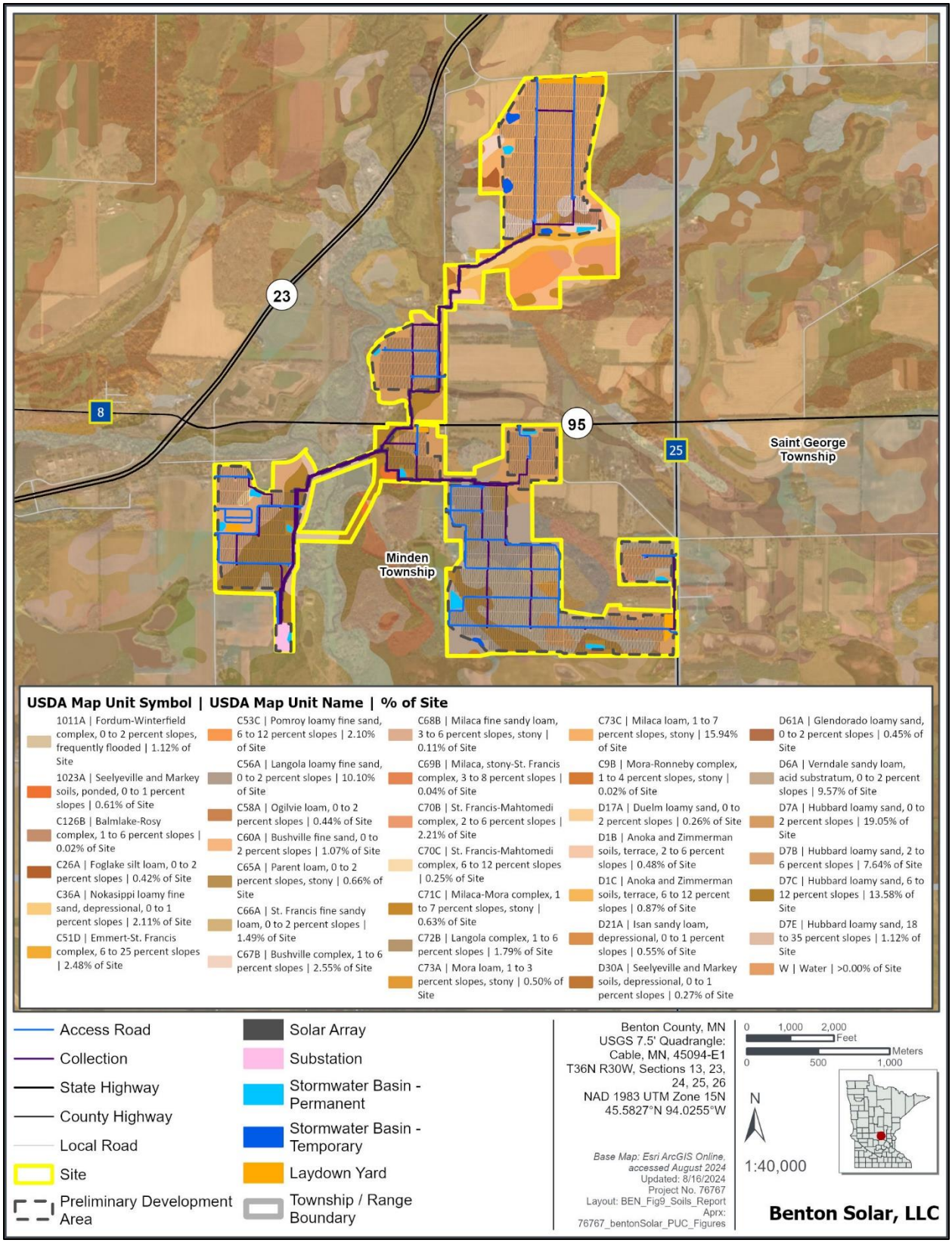

Figure 11. Soils in the Site and Preliminary Development Area.

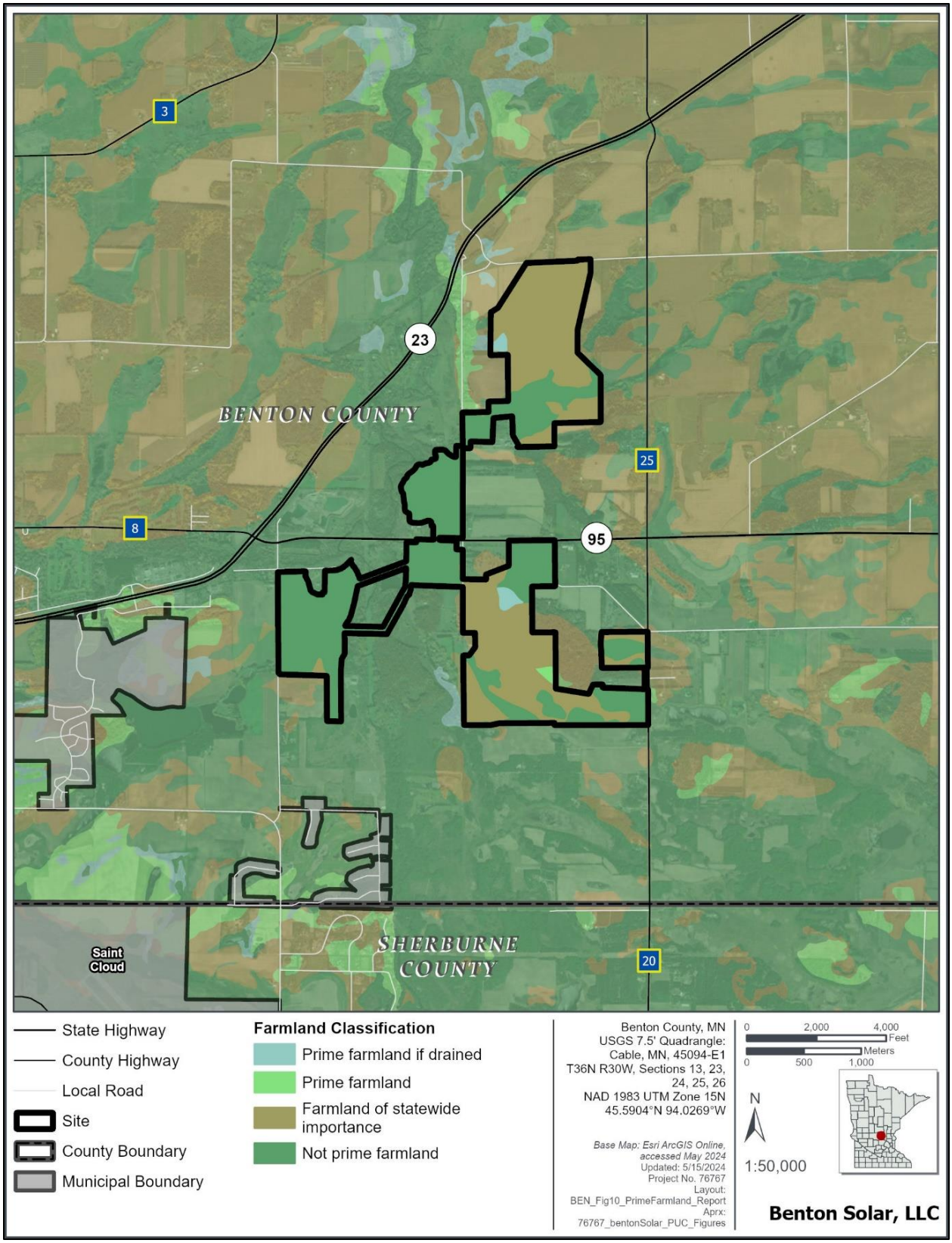

Figure 12. Prime farmland.

Table 4.5-5. Soil Summary within the Site

Map Unit Symbol	Soil Map Unit	Acres	Percentage of Site	Farmland Designation	Depth to Water Table (inches)	Water Erodibility	Wind Erodibility	Hydric Soil	Compaction Prone
D7A	Hubbard loamy sand, 0 to 2 percent slopes	181.2	19.1%	Not prime farmland	>80.0	Slight	Severe	Nonhydric	No
C73C	Milaca loam, 1 to 7 percent slopes, stony	151.7	15.9%	Farmland of statewide importance	24.0–43.0	Severe	Slight	Predominantly nonhydric	Yes
D7C	Hubbard loamy sand, 6 to 12 percent slopes	129.1	13.6%	Not prime farmland	>80.0	Slight	Moderate	Nonhydric	No
C56A	Langola loamy fine sand, 0 to 2 percent slopes	96.1	10.1%	Farmland of statewide importance	6.0	Moderate	Severe	Predominantly nonhydric	No
D6A	Verndale sandy loam, acid substratum, 0 to 2 percent slopes	91.1	9.6%	Farmland of statewide importance	>80.0	Slight	Moderate	Nonhydric	Yes
D7B	Hubbard loamy sand, 2 to 6 percent slopes	72.7	7.6%	Not prime farmland	>80.0	Slight	Severe	Nonhydric	No
C67B	Bushville complex, 1 to 6 percent slopes	24.2	2.5%	Farmland of statewide importance	12.0	Moderate	Severe	Predominantly nonhydric	No
C51D	Emmert-St. Francis complex, 6 to 25 percent slopes	23.6	2.5%	Not prime farmland	>80.0	Slight	Moderate	Nonhydric	No
C70B	St. Francis-Mahtomedi complex, 2 to 6 percent slopes	21.0	2.2%	Farmland of statewide importance	>80.0	Slight	Moderate	Nonhydric	Yes
C36A	Nokasippi loamy fine sand, depressional, 0 to 1 percent slopes	20.1	2.1%	Not prime farmland	0.0	Slight	Severe	Hydric	No
C53C	Pomroy loamy fine sand, 6 to 12 percent slopes	20.0	2.1%	Not prime farmland	18.0	Slight	Severe	Nonhydric	No
C72B	Langola complex, 1 to 6 percent slopes	17.0	1.8%	Farmland of statewide importance	12.0	Moderate	Severe	Predominantly nonhydric	No
C66A	St. Francis fine sandy loam, 0 to 2 percent slopes	14.1	1.5%	Farmland of statewide importance	>80.0	Slight	Moderate	Nonhydric	Yes
D7E	Hubbard loamy sand, 18 to 35 percent slopes	10.7	1.1%	Not prime farmland	>80.0	Slight	Severe	Nonhydric	No
1011A	Fordum-Winterfield complex, 0 to 2 percent slopes, frequently flooded	10.7	1.1%	Not prime farmland	0.0	Slight	Moderate	Predominantly hydric	No
C60A	Bushville fine sand, 0 to 2 percent slopes	10.1	1.1%	Farmland of statewide importance	6.0	Moderate	Severe	Predominantly nonhydric	No
D1C	Anoka and Zimmerman soils, terrace, 6 to 12 percent slopes	8.3	0.9%	Not prime farmland	>80.0	Slight	Severe	Nonhydric	No
C65A	Parent loam, 0 to 2 percent slopes, stony	6.2	0.7%	Prime farmland if drained	0.0	Moderate	Slight	Predominantly hydric	Yes

Map Unit Symbol	Soil Map Unit	Acres	Percentage of Site	Farmland Designation	Depth to Water Table (inches)	Water Erodibility	Wind Erodibility	Hydric Soil	Compaction Prone
C71C	Milaca-Mora complex, 1 to 7 percent slopes, stony	6.0	0.6%	Farmland of statewide importance	24.0–43.0	Moderate	Slight	Predominantly nonhydric	Yes
1023A	Seelyeville and Markey soils, ponded, 0 to 1 percent slopes	5.8	0.6%	Not prime farmland	0.0	Not rated	Slight	Hydric	No
C73A	Mora loam, 1 to 3 percent slopes, stony	4.8	0.5%	All areas are prime farmland	6.0	Moderate	Slight	Predominantly nonhydric	Yes
D1B	Anoka and Zimmerman soils, terrace, 2 to 6 percent slopes	4.6	0.5%	Not prime farmland	>80.0	Slight	Severe	Nonhydric	No
D61A	Glendorado loamy sand, 0 to 2 percent slopes	4.3	0.4%	Not prime farmland	12.0	Slight	Severe	Predominantly nonhydric	No
C58A	Ogilvie loam, 0 to 2 percent slopes	4.2	0.4%	Farmland of statewide importance	12.0	Moderate	Slight	Predominantly nonhydric	Yes
C26A	Foglake silt loam, 0 to 2 percent slopes	4.0	0.4%	Prime farmland if drained	0.0	Severe	Slight	Predominantly hydric	No
D30A	Seelyeville and Markey soils, depressional, 0 to 1 percent slopes	2.6	0.3%	Not prime farmland	0.0	Slight	Severe	Hydric	No
D17A	Duelm loamy sand, 0 to 2 percent slopes	2.5	0.3%	Not prime farmland	30.0	Slight	Moderate	Predominantly nonhydric	No
C70C	St. Francis-Mahtomedi complex, 6 to 12 percent slopes	2.4	0.2%	Not prime farmland	>80.0	Severe	Moderate	Nonhydric	Yes
C68B	Milaca fine sandy loam, 3 to 6 percent slopes, stony	1.1	0.1%	Farmland of statewide importance	18.0	Slight	Moderate	Predominantly nonhydric	Yes
D21A	Isan sandy loam, depressional, 0 to 1 percent slopes	0.5	0.1%	Not prime farmland	0.0	Slight	Severe	Predominantly hydric	No
C69B	Milaca, stony-St. Francis complex, 3 to 8 percent slopes	0.4	<0.1%	Not prime farmland	18.0	Slight	Moderate	Nonhydric	Yes
C9B	Mora-Ronneby complex, 1 to 4 percent slopes, stony	0.2	<0.1%	Farmland of statewide importance	16.0–24.0	Moderate	Slight	Predominantly nonhydric	Yes
C126B	Balmlake-Rosy complex, 1 to 6 percent slopes	0.2	<0.1%	All areas are prime farmland	>80.0	Moderate	Moderate	Nonhydric	Yes
W	Water	<0.1	<0.1%	Not prime farmland	n/a	Not rated	Not rated	Not rated	Not rated
–	**Total***	**951.4**	**100.0%**	–	–	–	–	–	–

Source: Soil Survey Staff (2024).

* Totals may vary slightly due to rounding.

4.5.4.1.2 Water Erosion

Erosion is a natural process where surface soil is worn away, typically by wind or water. Factors that influence the erosion potential of soil include gradation (distribution of soil particles), vegetative cover, length and percentage of slope, rainfall, and wind intensity. Soils on steep, long slopes are much more susceptible to water erosion than those on shallow, short slopes because the steeper slopes accelerate the flow of surface runoff.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentages of silt, sand, and organic matter; soil structure; and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Soil K factors were used to group soils into slight (0.05 to 0.20), moderate (0.25 to 0.40), and severe (> 0.40) water erosion classes (Michigan State University 2022).

The potential for water erosion within the Site is slight to severe with 618.5 acres (65.1%) rated as having a slight water erosion potential; 169.0 acres (17.7%) having moderate water erosion potential; and 158.1 acres (16.5%) having severe erosion potential (see Table 4.5-5). SSURGO does not provide factor K for the remaining 5.8 acres (0.6%) of the Site.

4.5.4.1.3 Wind Erosion

To assess the potential of soil erosion by wind, the wind erodibility group (WEG) was obtained for each SMU (Soil Survey Staff 2024). WEGs are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. Soils are grouped according to percentages of sand, silt, and clay; calcium carbonate content; presence of surficial coarse fragments; and surface wetness conditions. Soils within the 1 and 2 WEGs are classified as having a severe limitation for wind erosion. Soils in the 3, 4, and 4L WEGs are considered to have a moderate limitation for wind erosion. Soils in the 5, 6, 7, and 8 WEGs have a slight limitation for wind erosion.

The potential for wind erosion within the Site is slight to severe. Approximately 472.3 acres (49.7%) within the Site are rated as having severe wind erosion potential; 296.2 acres (31.1%) are rated as having moderate wind erosion potential; and 182.9 acres (19.1%) of the Site have a slight wind erosion potential. SSURGO does not provide WEG data for < 0.1 acre (< 0.1%) of the Site (see Table 4.5-5).

4.5.4.1.4 Hydric Soils

Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper horizon (Soil Science Glossary Terms Committee 2008). This includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation and soils that are sufficiently wet because of artificial measures. Locations where hydric soils are encountered may also contain artificial drainage systems. Benton Solar will identify, avoid, and repair drainage tile per the Project AIMP (see Appendix C).

Hydric soil category rating indicates the cumulative percentage of component(s) that meet the criteria for hydric soils within a map unit (Soil Survey Staff 2024). The class ratings are hydric (100%), predominantly hydric (66% to 99%), partially hydric (33% to 65%), predominantly nonhydric (1% to 32%), and nonhydric (0%).

Approximately 901.5 acres (94.6%) of the soils in the Site are classified as nonhydric or predominantly nonhydric. The remainder of the soils in the Site (5.3%; 49.9 acres) are classified as hydric or predominantly hydric. No soils in the Site are classified as partially hydric (see Table 4.5-5).

Drain tile identification, avoidance, and repair are described in detail in the AIMP, section 5.10 (see Appendix C).

4.5.4.1.5 Soil Compaction

Soil compaction occurs when soil particles are compressed. This modifies soil structure and can result in a reduction in the porosity and moisture-holding capability of the soil, thus restricting rooting depth. Compaction also decreases infiltration and thus increases runoff and the potential for water erosion. The risk for compaction is greatest when soil is wet. Therefore, fine-grained soils with poor drainage characteristics have the greatest propensity for compaction.

Soil compaction potential was evaluated by reviewing the drainage class and soil texture for SMUs in the Project soils. SMUs having fine texture in somewhat poor, poor, or very poor drainage classes were classified as being compaction prone.

Most of the soils in the Site (648.0 acres; 68.2%) are not susceptible to compaction. Approximately 303.4 acres (31.7%) in the Site are susceptible to compaction based on drainage class and texture. Approximately < 0.1 acre (< 0.1%) of the soils in the Site are not rated for compaction (see Table 4.5-5).

4.5.4.2 IMPACTS AND MITIGATION

Construction activities may result in adverse impacts on soil resources. Clearing removes protective vegetative cover and exposes soil to the effects of wind and precipitation, which could potentially lead to erosion and the loss of valuable soil resources and greater sediment yield to nearby water resources. The potential for increased erosion would be greatest in the short-term following surface disturbance activities and would decline over time due to stabilization resulting from construction finalization, revegetation practices, and natural processes. Unreclaimed surface disturbances (i.e., Facilities and accompanying access/travel routes) could increase soil erosion during the life of the Project unless adequately stabilized. The susceptibility for increased erosion will be reduced through implementation of the AIMP (see Appendix C), Project SWPPP, proper implementation of erosion control methods, and successful, timely revegetation of disturbed areas (see Appendix D).

Grading and equipment traffic can compact soil, impacting soil structure and reducing porosity, which leads to lower infiltration and increased runoff potential. Soil compaction from construction activities can also reduce soil productivity. Construction equipment traveling over wet or saturated soils could damage soil structure, reduce pore space, and cause rutting and topsoil-subsoil mixing. Excessive compaction can lead to: 1) reduced water infiltration into the soil and reduced permeability of water through the soil; 2) reduced diffusion of oxygen, CO_2, and other gases into and out of the soil; 3) reduced plant root development and penetration; and 4) reduced plant growth and production. The effects of soil compaction will be reduced using designated travel corridors and the use of low-ground-pressure tire or tracked equipment during construction activities, limiting construction during wet soil conditions, and using sound Site preparation practices, such as performing disking and deep ripping activities using appropriate agronomic equipment during revegetation.

Furthermore, grading may mix topsoil and subsoil, which can result in long-term reduction of agricultural productivity. Grading, excavation, and backfilling could also lead to the introduction of excavated rocks into the soil surface (from the fracturing of bedrock and excavation of rock and/or gravel), which could result in future increases in operation labor, reduced agricultural productivity, and potential damage to

agricultural field equipment. Excess rock brought to the surface can also impede revegetation efforts. In locations where construction activities include grading, excavating, or removing soil, such as for foundations or ground leveling, topsoil will be segregated from subsoil. Topsoil and subsoil will be stockpiled separately and identified with appropriate signage within designated areas of the construction workspace. Upon completion of construction activities, subsoil and topsoil will be replaced in the reverse order removed (see Section 3.4.6 and Appendix C).

Installation of the Project also can be beneficial for soil resources. Most of the Site is currently in agricultural production. Removal of land from intensive agricultural practices (e.g., tillage, pesticide application, monocultural cropping) will allow soil resources to rest and regenerate to a more productive state (U.S. Department of Energy 2023). The establishment of regionally appropriate vegetation will improve soil resources by reducing tillage that destroys vital soil structure, improving soil organic matter content through robust root development, and enhancing soil microorganism and fauna populations following years of intensive tillage and compaction and use of pesticides and fertilizer. Additionally, over time, regionally appropriate vegetation is expected to out-compete weeds, which will provide a more diverse, healthy ecosystem and reduce maintenance and operating costs.

Soil contamination from equipment spills and/or leakage of fluids could also impact soils. Certain practices and mitigation measures, such as the implementation of the Project AIMP (see Appendix C) and a spill prevention, control, and countermeasures (SPCC) plan, will help minimize impacts on soil resources. Specifically, soil impacts will be mitigated through measures such as topsoil segregation, erosion controls, BMPs, and postconstruction restoration and revegetation of construction work areas. BMPs for erosion and sediment control may consist of temporary seeding, permanent seeding, mulching, filter strips, erosion control blankets, rock check dams, and roadway surfacing.

The following additional mitigation measures will protect and preserve soil resources:

- Employ a qualified soil scientist to delineate topsoil depths in construction areas requiring grading, excavation, and backfilling to properly identify topsoil depths for salvaging resources;
- Avoid using topsoil resources for any purpose other than planting medium;
- Minimize clearing and grubbing activities and soil disturbances to the extent possible to avoid impacts on soil and vegetation resources (e.g., erosion, soil compaction, topsoil/subsoil mixing);
- Implement the Project AIMP and ensure that personnel working on-site are familiar with and implement the standards and policies that serve to avoid, minimize, and/or mitigate negative agricultural impacts;
- Implement the Project SPCC plan during construction and operation activities to minimize the potential effects of spilled fluids;
- Implement appropriate and timely revegetation practices to stabilize and protect soil resources; and
- Manage stormwater and drainage through installation of stormwater basins.

These mitigation measures emphasize protection of soil resources and require that workers be informed regarding their presence and that they are cognizant of their impacts. In combination, these mitigation measures would minimize construction and operation impacts to soil resources.

4.5.5 Geology and Groundwater

4.5.5.1 EXISTING CONDITIONS

Although the geologic history of Minnesota dates back billions of years, the surface and near-surface geologic layers of the Site have been most heavily influenced by numerous glaciation events during the Quaternary period's Pleistocene epoch (2.6 million–11,700 years ago). The epoch, more commonly known as the ice age, consisted of ice sheets moving across much of the Great Lakes Region, including Minnesota and the area now considered Benton County. Minnesota was at the edge of the principal glacier covering North America, the Laurentide Ice Sheet, and experienced multiple ice-free and glaciation periods as lobes of the sheet successively drifted and receded across the region. The earliest ice cover may have come as early as 1.2 mega annum (1 million years), although evidence of the event has predominantly been obscured by more recent glaciation events, including the most recent, the Wisconsin Glaciation Stage, which ended approximately 11,000 years ago. During this time, lobes of the Laurentide Ice Sheet moved across central Minnesota, leaving behind much of the glacial drift, or sediment material associated with glacial presence, that characterizes the Site today (Minnesota Geological Survey 2017).

The composition and thickness of glacial drift in Benton County varies greatly across its boundaries and is a function of the numerous distinct glaciation episodes. The drift is primarily composed of unsorted sand, gravel, and rock sediments deposited out of the glaciers (till) and settled fine-grained sediment associated with glacial meltwater. Quaternary-era aquifers in the region are primarily held within the sandy meltwater precipitate strata and are bounded by layers of till aquitards. However, glacial erosion of sediment layers deposited in previous glacial episodes created a heterogeneous network of aquifer supporting sand across central Minnesota. Benton County consequently suffers from a discontinuous array of aquifers (University of Minnesota and Minnesota Geological Survey 2010).

Hydrogeography data from MDNR indicates that the Anoka Sand Plain Aquifer lies beneath the Site and varies between a few feet to over 75.0 feet in thickness. The aquifer sits at a depth between 970.0 and 1,030.0 feet, which is on the shallower end of those found in Benton County (MDNR 2012). Enough water to sustain personal-use wells can be found at significantly shallower depths in the region (MDH 2021).

Benton Solar reviewed known information regarding groundwater under the Site for EPA-designated sole source aquifers (SSAs). An SSA is defined by the EPA as an aquifer that "supplies at least 50 percent of the drinking water for its service area" and where "there are no reasonably available alternative drinking water sources should the aquifer become contaminated" (EPA 2024a). In areas supplied by SSAs, contamination can create a significant public health hazard. Benton Solar identified no SSAs in the Site (EPA 2024b). The Applicant also reviewed the Minnesota County Well Index to assess whether the Project would impact any wells in the Site or vicinity. The County Well Index is maintained by the Minnesota Geological Survey and MDH and provides up-to-date records of the existence and exact locations of wells across the state. The database indicated that two irrigation wells are within the Site. The wells are located in the Preliminary Development Area and intersect the location of proposed solar arrays (MDH 2021).

Under directive of the Safe Drinking Water Act, every state is required to have a Wellhead Protection Program that prevents drinking water contamination through the identification of surface-based recharge zones for public supply wells. In 1986, the scope of the Safe Drinking Water Act was revised and broadened to include a Source Water Assessment Program that directs a watershed and aquifer-level approach to identifying potential contamination zones. The MDH administers the state's Wellhead Protection Program and is responsible for the delineation of Wellhead Protection Areas (WHPA). These are defined as "the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield" (EPA 2024c). WHPAs are delineated based on 10-year groundwater time-of-travel to wells and are maintained in

an up-to-date publicly available database. Benton Solar queried the database and determined that there are no WHPAs in the Site. The nearest WHPA, Foley West, is located 3.6 miles northeast of the Site near the town of Foley (MDH 2019).

The MDNR does not show that any karst features are mapped in Benton County, including in the Site (MDNR 2024b). Further, the Minnesota Geological Survey does not provide karst hydrogeomorphic unit mapping for Benton County (Minnesota Geological Survey 2024).

4.5.5.2 IMPACTS AND MITIGATION

Impacts to geologic resources in the Site and nearby vicinity are likely to be limited. Because large quantities of glacial drift cover the Site, near-surface excavation or blasting that could be associated with the Project would not impact bedrock, and altered groundwater flow regimes caused by fractured bedrock are not anticipated. Due to the lack of impacts, mitigation will not be necessary. Two irrigation wells are mapped within the Preliminary Development Area, within proposed array areas. Facilities (e.g., foundations) will avoid these resources. If any dewatering is needed during construction, discharge will be directed to the surrounding surface, allowing it to naturally infiltrate back into the water table, thereby minimizing contamination and potential impacts. If dewatering is needed, a Water Appropriation Permit will be obtained from MDNR. Due to the limited water supply needs of the Project, Benton Solar will not be installing any wells and impacts to water resources lying in subterranean aquifers are not anticipated. From a geologic perspective, Project infrastructure will result in a minor amount of increased impervious surface area (e.g., access roads, BESS, substation) and will not impact groundwater recharge. Further, the Project will not require the use or storage of large quantities of hazardous materials that might otherwise have potential to spill or leak into area groundwater. Benton Solar will develop and maintain an SPCC plan for the Project. The SPCC plan will address potential spills, leaks, and responses to minimize the potential for hazardous materials to enter groundwater resources. No additional impacts to geological resources are anticipated, and no mitigation measures beyond the SPCC plan are proposed.

4.5.6 Surface Waters, Floodplains, and Shoreland

4.5.6.1 EXISTING CONDITIONS

The Site is located in the Clearwater-Elk River Watershed (Hydrologic Unit Code [HUC] 07010203) and the County Ditch No. 13-Elk River Subwatershed (HUC 070102030304) (MDNR 2023b).

The USGS National Hydrography Dataset (USGS 2023b) identifies five features within the Site, including the Elk River. The Elk River, identified as a Clean Water Act Section 303(d)–impaired water (MPCA 2022c), ultimately discharges to the Mississippi River near the City of Elk River (Figure 13). Of these five National Hydrography Dataset features, three are mapped in the Preliminary Development Area. The National Park Service Nationwide Rivers Inventory does not identify any free-flowing stream or river sections in the Site (National Park Service 2022).

The National Wetlands Inventory (NWI) (USFWS 2023b) indicates that there are nine potential surface water features (deepwater habitats) that are not wetlands within the Site, four of which are mapped in the Preliminary Development Area.

There are 22.1 acres of Federal Emergency Management Agency–mapped floodplains in the Site, and 1.9 of these acres also occur in the Preliminary Development Area (MDNR and Federal Emergency Management Agency 2023). These floodplains are Special Flood Hazard Areas classified as Flood Zone A, with a 1.0% annual chance flood hazard.

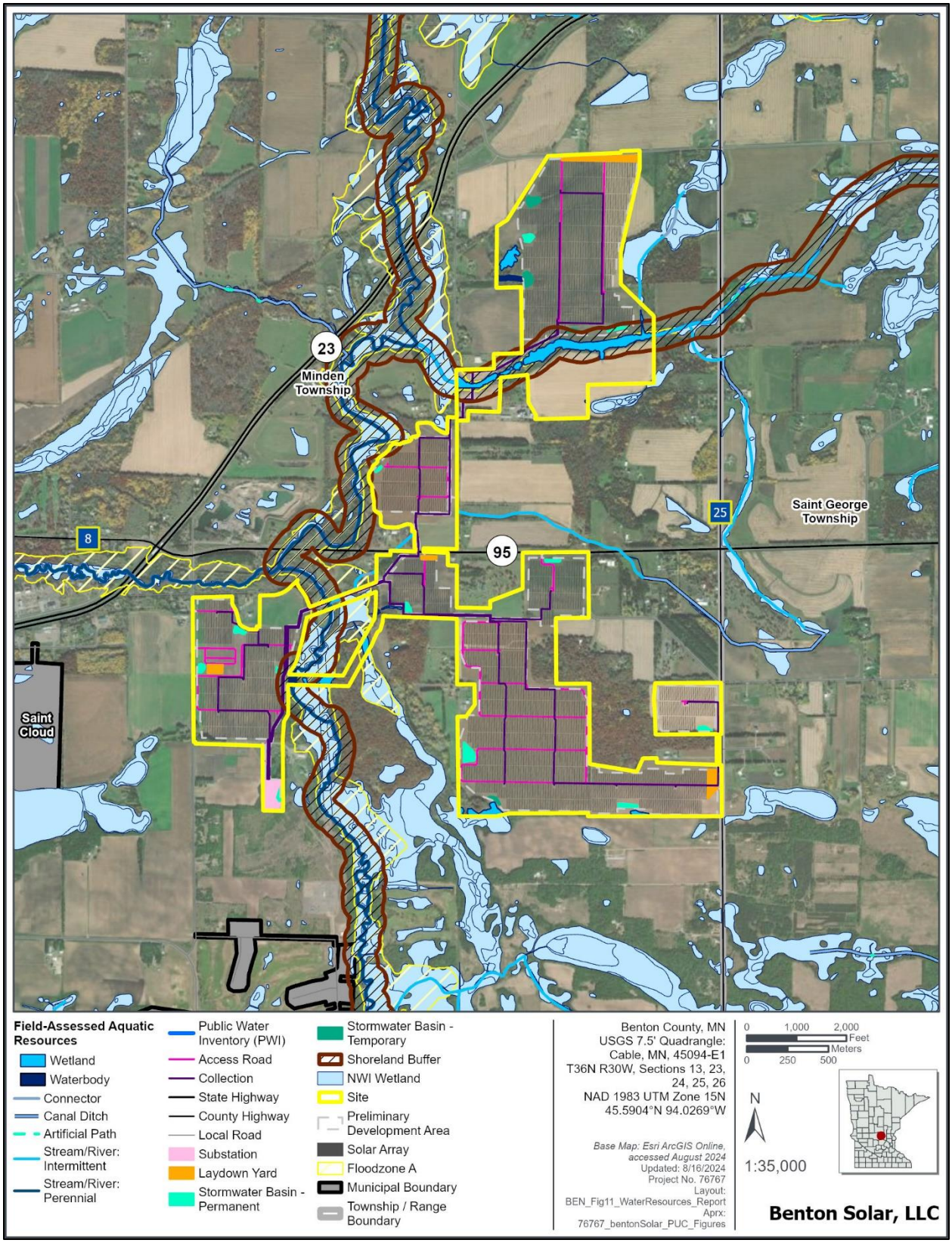

Figure 13. Water resources.

Shoreland is defined as a zone "within 1,000.0 feet of the ordinary high water mark of a lake or 300.0 feet of a river or stream on the landward side of a flood plain on such river" (Benton County 2023b). Minnesota's local government shoreland area standards protect shoreland areas (streams, river, lakes, and wetlands) and promote public health and general welfare in accordance with federal and state regulations (MDNR 2016a). Outside of the floodplains, there are 68.3 acres of mapped shoreland in the Site, only 12.3 of which are also mapped in the Preliminary Development Area (Benton County 2023b, 2023c, 2023d). Approximately 6.7 acres of shoreland overlap Facilities in the preliminary Site design according to the publicly available information.

Benton Solar completed aquatic resources field surveys for the Project in 2022, 2023, and 2024 with the objective of verifying, or updating, the publicly available information. Benton Solar observed and delineated four waterbodies (totaling 1.7 acres) and two waterbodies (totaling 0.2 acre) in the Site and Preliminary Development Area, respectively (Table 4.5-6; see Figure 13). Survey methods and results are described in the aquatic resources delineation report (Appendix J).

Table 4.5-6. Waterbodies Delineated within the Site and Preliminary Development Area

Hydrologic Regime	Waterbody Name	Site		Preliminary Development Area	
		Acres	Linear Feet	Acres	Linear Feet
Perennial river	Elk River	0.5	400.1	0.1	60.8
Ephemeral drainage	Unnamed stream	0.0	104.3	–	–
Intermittent stream	Unnamed stream	0.1	520.5	–	–
Perennially flooded pond	Unnamed	1.1	-	0.1	–
Total		**1.7**	**1,024.9**	**0.2**	**60.8**

4.5.6.2 IMPACTS AND MITIGATION

Benton Solar designed the Project to avoid impacts to surface waters, floodplains, and shoreland to the extent practicable. Based on the preliminary Site design, only collection lines intersect surface waters, such as the Elk River and the unnamed stream, and floodplains. At surface water locations, Benton Solar will accomplish construction through HDD beneath the riverbed via upland-to-upland entry and exit points rather than via trenching to avoid impacts to the aquatic resource features' beds and banks. Benton Solar will coordinate with the county to determine if a floodplain alteration permit is required installation of collection lines and will obtain the permit prior to construction if needed. Approximately 12.3 acres of mapped shoreland area is present in the Preliminary Development Area. Benton Solar will coordinate with the county to determine if a shoreland alteration permit is required for the Project and will obtain the permit prior to construction if needed.

Additionally, throughout construction, Benton Solar will implement its Project SWPPP to ensure avoidance and minimization of impacts to surface waters, floodplains, and shoreland areas. The SWPPP will include BMPs (e.g., erosion control and soil exposure/stabilization measures) to avoid and minimize impacts to these areas (e.g., prevent sediment from entering waterbodies). Additionally, Benton Solar has preliminarily designed several stormwater drainage basins within existing low-lying areas to help control runoff during rain events. Because impacts to surface waters, floodplains, and shoreland are being avoided, Benton Solar does not anticipate that any related permits will be required.

4.5.7 Wetlands

4.5.7.1 EXISTING CONDITIONS

Benton Solar determined the potential for wetlands to occur through a desktop review of publicly available information including aerial imagery, the USFWS NWI (USFWS 2023b), and SSURGO (Soil Survey Staff 2023). The NWI (USFWS 2023b) indicates that 23 potential wetland features are mapped within the Site, three of which are also mapped as occurring in the Preliminary Development Area.

Benton Solar completed aquatic resources surveys for the Project in 2022, 2023, and 2024 with the objective of verifying, or updating, the publicly available information. A total of 13 wetlands totaling 23.5 acres were observed and delineated within the Site (Table 4.5-7). Approximately 0.1 acre of wetlands occurs in the Preliminary Development Area. Survey methods and results are described in the aquatic resources delineation report (Appendix J).

4.5.7.2 IMPACTS AND MITIGATION

The Preliminary Development Area avoids impacts to delineated wetlands. Therefore, Benton Solar anticipates that no related permits will be required. If impacts become unavoidable, the Project will meet requirements for a U.S. Army Corps of Engineers regional general permit. Prior to construction activity, Benton Solar will coordinate with the U.S. Army Corps of Engineers and the Benton County Soil and Water Conservation District, which is the local government unit that administers the Minnesota Wetland Conservation Act, as needed. In addition, a Project SWPPP will be developed prior to construction that will include BMPs, revegetation plans, and management of exposed soils to prevent sediment from entering wetlands.

Table 4.5-7. Wetlands Delineated in the Site and Preliminary Development Area

Type	Acreage	
	Site	Preliminary Development Area
Palustrine emergent	<0.01	–
Palustrine emergent	0.1	–
Palustrine farmed	0.1	–
Palustrine emergent	0.1	–
Palustrine emergent	0.3	–
Palustrine forested	0.4	–
Palustrine farmed	0.7	–
Palustrine forested	1.1	–
Palustrine emergent	1.6	–
Palustrine emergent	2.2	–
Palustrine forested/ palustrine emergent	2.3	–
Palustrine emergent	3.2	0.1
Palustrine emergent wetland	11.5	–
Total	**23.5**	**0.1**

4.5.8 Vegetation

4.5.8.1 EXISTING CONDITIONS

4.5.8.1.1 General

The Project lies within two Level IV ecoregions. The northern half of the Project lies within the McGrath Till Plain and Drumlins, which is a transition from hardwood forest and hay farming in the north to cultivated crops in the south. The pre-settlement vegetation was prairie in the southwest, aspen-oak woodlands and oak openings and savanna in the southeast, and hardwoods and aspen-oak woodlands in the north (north of the Sauk River). The southern half of the Project lies within the Anoka Sand Plain and Mississippi Valley Outwash, which is characterized as a sandy lake plain and terraces along the Mississippi River. The pre-settlement vegetation was primarily oak openings and savanna in the sandy areas with an area of wet prairie in the eastern part of the ecoregion and with prairie on the terraces near the Mississippi.

Benton Solar completed a desktop analysis to characterize the existing vegetation in the Site. The desktop analysis consisted of a review of publicly available resources providing relevant environmental data, including the USGS National Land Cover Database (see Section 4.2.10), USDA National Agriculture Statistics Service data, and high-resolution aerial imagery. Biologists experienced with aerial photography interpretation and the ecological communities of central Minnesota aggregated the data using GIS software and performed a manual review. Dominant land cover types in the Site are cultivated crops (88.1%) followed by hay/pasture (4.5%) and deciduous forest (3.6%). Together, these three land cover types comprise 915.8 acres. Within the Preliminary Development Area, the dominant land cover type is cultivated crops (97.3%) totaling 614.5 acres (see Section 4.2.10).

Benton Solar completed aquatic resources surveys for the Project in 2022, 2023, and 2024. During these surveys, pedestrian observations indicated that the vegetation in the Site is typical of agricultural areas in central Minnesota. Upland areas were dominated by common hackberry (*Celtis occidentalis*), white oak (*Quercus alba*), bur oak (*Q. macrocarpa*), sugar maple (*Acer saccharinum*), reed canarygrass (*Phalaris arundinacea*), ground ivy (*Glechoma hederacea*), goldenrod (*Solidago altissima*), green bristlegrass (*Setaria viridis*), yellow foxtail (*S. pumila*), and smooth brome (*Bromus inermis*). American elm (*Ulmus americana*), Canada thistle (*Cirsium arvense*), and stinging nettle (*Urtica dioica*) are also present in upland areas. Dominant wetland vegetation included green ash (*Fraxinus pennsylvanica*), sugar maple, river birch (*Betula nigra*), broadleaf cattail (*Typha latifolia*), common spikerush (*Eleocharis palustris*), common threesquare (*Schoenoplectus pungens*), reed canarygrass, wildrye (*Elymus virginicus*), and barnyard grass (*Echinochloa crus-galli*). Softstem bulrush (*Schoenoplectus tabernaemontani*), narrowleaf cattail (*Typha angustifolia*), sensitive fern (*Onoclea sensibilis*), switchgrass (*Panicum virgatum*), prairie cordgrass (*Spartina pectinata*), and broadleaf arrowhead (*Sagittaria latifolia*) were also present within wetlands.

Federally listed and state-listed species are discussed in Section 4.5.9.

4.5.8.1.2 Noxious Weeds

Noxious weeds are addressed by state and federal rules and regulations designed to stop the spread of plants that may be detrimental to the environment, agricultural practices, and/or the public (Minn. Stat. § 18.76–18.91) (MDA 2023a). The MDA identifies 51 species as state-listed noxious weeds (see Appendix D) (MDA 2023b). While county boards have the authority to develop county noxious weeds lists, Benton County does not list any additional noxious weeds beyond those identified by state and federal agencies (MDA 2023c). During aquatic resources surveys, ditches and swales were observed to contain a relatively low percentage of the state-listed noxious weed wild parsnip (*Pastinaca sativa*) and Canada thistle (*Cirsium arvense*).

4.5.8.2 IMPACTS AND MITIGATION

4.5.8.2.1 General

Benton Solar has minimized permanent impacts to vegetation by siting Facilities in currently disturbed areas (e.g., cultivated cropland) to the extent practicable. Project construction will result in the long-term conversion of current vegetation in the Preliminary Development Area, which includes the loss of crop production on up to 614.5 acres, and the loss of 10.1 acres of forested land cover, for the life of the Project (see Tables 1-1 and 4.2-9). Benton Solar has minimized vegetation removal considerably by maximizing use of lands already disturbed (e.g., cropland) and employing HDD methods in sensitive areas. Tree clearing necessary for installing underground electrical collection lines near and under the forested Elk River riparian corridor will be limited to HDD boring entry points and access to those entry points, as needed.

Project construction will also result in short-term impacts to vegetation. For example, construction and use of laydown yards will result in the temporary removal or alteration of current land cover on 6.6 acres (see Table 1-1). Impacts will be minimized and mitigated through implementation of BMPs as described in the Project SWPPP. Such BMPs include installation of erosion control devices. Following completion of Project construction, areas of temporary disturbance will be restored to preconstruction conditions or revegetated as described in Section 3.4.6, the SWPPP, and the VMP (see Appendix D).

Following Project construction and during Project operation, Benton Solar will install prescribed seed mixes in designated "management areas" (i.e., the array management area [510.8 acres] and the buffer management area [55.1 acres]) as described in the VMP (see Appendix D). The primary goals of the VMP are to establish regionally appropriate vegetation that, to the extent practicable: 1) will not impede Project operation; 2) will minimize the presence of noxious weeds and reduce long-term maintenance and invasive species management efforts; 3) will help to control erosion and runoff; and 4) will increase ecological diversity and function. Vegetation management is designed to continue for 3 years and then transition into long-term maintenance throughout the life of the Project (see Appendix D).

Upon Project decommissioning, Benton Solar will restore the Site to approximate preconstruction conditions to the extent possible. Benton Solar anticipates that the majority of the Site will be returned to agricultural use post-decommissioning (see Appendix E).

4.5.8.2.2 Noxious Weeds

Project construction could result in short-term potential to spread noxious weed species as a result of construction equipment introducing seeds into new areas or erosion or sedimentation due to ground-clearing in construction areas. Benton Solar will minimize the potential to introduce noxious weeds, or create favorable environments in which noxious weeds establish, through the use of standard BMPs including the following:

- washing vehicles and equipment prior to entering disturbed areas;
- installing erosion control devices; and
- revegetating disturbed areas consistent with Section 3.4.6 and the VMP (see Appendix D).

One of the VMP's primary objectives is to reduce long-term maintenance and weed management through establishment and management of target vegetation. Following permanent vegetation establishment, Benton Solar will employ vegetative management techniques, including targeted herbicide use, if substantial areas of noxious weeds are observed (see Appendix D).

No impacts related to noxious weeds during Project O&M are anticipated.

4.5.9 Wildlife

4.5.9.1 EXISTING CONDITIONS

4.5.9.1.1 Avian Species

The Site occurs in the Mississippi Flyway, an important north-south migration corridor between wintering habitat and breeding areas, and in the Prairie Hardwood Transition Bird Conservation Region (The National Audubon Society 2023; U.S. North American Bird Conservation Initiative 2021). The USFWS Information for Planning and Consultation (IPaC) report identified 16 species of Birds of Conservation Concern (species given the USFWS's highest conservation priority) (USFWS 2021) with potential to occur in or near the Site (Appendix K). These species include bobolink (*Dolichonyx oryzivorus*), chimney swift (*Chaetura pelagica*), eastern whip-poor-will (*Antrostomus vociferus*), and red-headed woodpecker (*Melanerpes erythrocephalus*) (Appendix K). There are no Important Bird Areas located within or directly adjacent to the Site.

The Migratory Bird Treaty Act of 1918 (16 United States Code 703–712) prohibits the taking, selling, transporting, and importing of migratory birds or their nests, eggs, parts, or products, and protects more than 800 bird species occurring in the United States. Most birds in the Site would be afforded protection under the Migratory Bird Treaty Act. Migratory bird species that may occur in the Site include species common to a mosaic of limited wetlands, woodlots, and herbaceous cover. Other species likely to use the Site, including the Preliminary Development Area, would be adapted to disturbed land cover types, including cultivated fields and nonnative grass patches. Such species include horned lark (*Eremophila alpestris*) and American goldfinch (*Spinus tristis*) (Cornell Lab of Ornithology 2019).

Non-migratory birds that may occur in the Site include wild turkey (*Meleagris gallopavo*) and ring-necked pheasant (*Phasianus colchicus*) (MDNR 2023e). Some waterfowl, including mallard (*Anas platyrhynchos*), may forage on crop seeds or use ditches present at the Site. Other seed-eating birds such as rock pigeon (*Columba livia*) and mourning dove (*Zenaida macroura*) are likely to occur at the Site (Cornell Lab of Ornithology 2019).

4.5.9.1.2 Other Wildlife Species

In addition to birds, mammals, reptiles, fish, and insects may occur in the Site, including the Preliminary Development Area. Common mammal species that have adapted to a mosaic of land cover, such as cultivated crops, developed areas, and pastures, are likely to occur in the Site. Such species include opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), common raccoon (*Procyon lotor*), coyote (*Canis latrans*), and eastern cottontail (*Sylvilagus floridanus*) (MDNR 2023f). Common reptile and amphibian species that may occur in the Site include northern leopard frog (*Lithobates pipiens*), eastern tiger salamander (*Ambystoma tigrinum*), painted turtle (*Chrysemys picta*), and American toad (*Anaxyrus americanus*) (MDNR 2023g). These herptile species are tolerant of a variety of habitats such as cultivated fields and uplands such as those found in the Site (LeClere 2023; MDNR 2023g). Common aquatic species, including fish, may be present in the limited aquatic resources present at the Site. Insects found in the Site would include pollinators such as bees and butterflies.

Federally and state-listed species are discussed in Section 4.5.9.

4.5.9.2 IMPACTS AND MITIGATION

The Site and Preliminary Development Area are primarily agricultural and developed (95.2% and 99.2%, respectively). Accordingly, occurrence of wildlife in the majority of the Site likely is limited to common species adapted to a mosaic of land cover types, including cultivated crops, developed areas, and pastures. Benton Solar will avoid and/or minimize impacts to the extent practicable where wildlife diversity may be relatively highest in the Preliminary Development Area (e.g., forest remnants, wetlands). During construction, mobile wildlife individuals may be displaced to adjacent habitats. Less mobile species or immobile individuals, ground nests, and eggs may be impacted through collision with, or crushing by, construction equipment. However, such impacts may have occurred as a result of ongoing agricultural practices in the absence of Project development. Project construction is expected to have minimal impacts on individuals of common wildlife species and no impact on their populations.

Reclamation and revegetation of temporarily disturbed areas within the Preliminary Development Area may provide a net benefit to some wildlife species by providing potential bird nesting and pollinator habitat. Portions of the Preliminary Development Area (a total of 569.5 acres) designated as "management areas" in the VMP will be revegetated with seed mixes specifically designed to revegetate array areas and buffer areas (see Appendix D). These seed mixes will increase vegetative diversity as compared to current land use and are expected to provide an increase in available habitat for some species (see Appendix D).

Benton Solar will install approximately 58,768.1 linear feet of permanent security fencing along the perimeter of the Preliminary Development Area, excluding minor portions of some Facilities (e.g., select access roads). Generally, fencing can impact wildlife in the following ways:

- wildlife travel corridors could be disrupted;
- individuals could become stuck or tangled in the fencing;
- individuals could become trapped inside the fencing; and
- larger mammals excluded from the Preliminary Development Area due to fencing could have increased presence on adjacent roadways, leading to an increase in animal (e.g., deer) and vehicle collisions.

Benton Solar has prioritized the use of currently disturbed (e.g., agricultural) land for siting Facilities. Additionally, Benton Solar has designed the Project to minimize impacts to aquatic and forested habitat, with which wildlife travel corridors are often associated. Therefore, Benton Solar does not anticipate that the Project will impact wildlife travel corridors. Benton Solar will install perimeter fencing following MDNR recommendations (i.e., 8.0-foot, woven wire fence topped with two strands of smooth, high tensile wire) to exclude large mammals (e.g., deer). Benton Solar understands that it will be responsible for safely removing any deer under a valid removal permit in the unlikely instance that one becomes trapped inside the Preliminary Development Area.

The MDNR generally recommends a minimum distance of 50.0 feet between fencing and road ROWs to provide space for animals to travel around the fence rather than being directed onto roadway. Benton Solar has designed the Project to align with this guidance to the extent practicable with consideration to land access and Site control.

During Project O&M activity, potential impacts on wildlife include collision with Facilities (e.g., solar panels) and collisions with or crushing by vehicle traffic and mowing practices. As with construction, mobile individuals are expected to flee traffic and mowing disturbances and temporarily occupy adjacent habitats. Less mobile species or immobile individuals, ground nests, and eggs may be impacted. Occurrences of traffic and mowing activity will be individually short-lived and intermittent. However, such

impacts may have occurred as a result of ongoing agricultural practices in the absence of Project development.

Some bird species may be attracted to solar panels due to a possible phenomenon known as "lake effect" (Chock et al. 2020). Bird collisions with solar panels have occurred, particularly with migratory water birds that presumably perceive solar panels as waterbodies and are attracted to land on them, causing stranding, injury, or death (Kagan et al. 2014). Benton Solar will minimize the potential for such impacts to occur by using less reflective panels or non-polarizing white grids between panels to break up the polarized reflection of light.

Following restoration and revegetation, and during Project O&M, the Project is likely to provide additional suitable wildlife habitat for individuals inhabiting, or traveling through, the Preliminary Development Area (e.g., birds, pollinators). Benton Solar will restore designated areas of impact with seed mixes expected to provide habitat for species such as grassland birds and pollinator insects. Minimal acres will be converted to permanent Facilities (e.g., PCUs, BESS, substation). However, up to 614.5 acres (including the PV arrays) will be converted from primarily agricultural land to regionally appropriate vegetation providing potential nesting, feeding, and sheltering habitat for wildlife (see Appendix D).

4.5.10 Rare and Unique Natural Resources

Minn. R. 7850.1900, subp. 3F, requests the Applicant consider effects of the facility on rare and unique natural resources. Further, the MDNR *Commercial Solar Siting Guidance* (MDNR 2023a) recommends identifying the following "high value natural resources" for solar project development: 1) special-status species; 2) MBS sites of biodiversity significance and native plant communities; 3) shorelands and floodplains; 4) public waters; 5) calcareous fens; 6) wetlands; 7) large block habitats (e.g., grasslands > 40.0 acres) and other important habitats; and 8) public land (MDNR 2023h). Shorelands and floodplains, public waters, wetlands, and public land are addressed in Sections 4.5.5, 4.5.6, and 4.2.8, respectively. The remaining high-value natural resource types are described below.

4.5.10.1 EXISTING CONDITIONS

4.5.10.1.1 Federally Listed and Protected Species

Benton Solar reviewed the USFWS IPaC report in 2023 to identify federally endangered and threatened species, proposed species, candidate species, and designated critical habitat under the Endangered Species Act that may occur in the Site. In 2024, Benton Solar conducted a second IPaC review to ensure it had the most recent data for the current Site. A copy of both reviews are included in Appendix K. The IPaC reviews indicated four federally listed, proposed listed, or candidate animal species with potential to occur in the Site due to overlapping ranges. Each of these species, and its potential to occur in the Site, is discussed below.

- **Northern long-eared bat** (*Myotis septentrionalis*) (endangered). The northern long-eared bat occurs throughout Minnesota, hibernating in mines and caves during winter months (November–March). During the warm season, northern long-eared bat habitat consists of woodland and forested areas where they roost, travel, and forage on insects. Northern long-eared bats are a forest interior species, showing a preference for roosting and foraging away from edge habitat in larger contiguous blocks of forest (USFWS 2023c). Potential roost sites consist of trees with cracks, hollows, and crevices (USFWS 2023c). Individual trees may be used by northern long-eared bats as a roost when they are located within 1,000.0 feet of forested habitat. Human-made structures such as barns, houses, and bridges also are used as roosts by northern long-eared bats and are considered potential active season habitat (USFWS 2023c).

  - Documented hibernacula and roost tree records are maintained in the MDNR's Natural Heritage Information System (NHIS). NHIS reviews did not indicate hibernacula or roost trees as being present within the Site (see Appendix K). While no roost trees are located in Benton County, hibernacula are known to occur (MDNR 2022).
  - Woody vegetation in the Site is primarily associated with forest remnants (e.g., along Elk River), woodlot patches, and individual trees. These areas have potential to provide habitat for roosting, traveling, and foraging bats during the spring, summer, and fall. Therefore, the northern long-eared bat has potential to occur in the Site, including in the Preliminary Development Area.

- **Tricolored bat** (*Perimyotis subflavus*) (proposed endangered). Tricolored bats winter in mines and caves or in road-associated culverts where caves are scarce. During the spring, summer, and fall months, these bats can occur in forested habitats where they primarily roost among leaves. Females may roost alone or in small colonies. Although research on tricolored bat foraging is limited and conflicting results have been observed, it appears that the species forages in more open areas such as forest openings and early successional areas (Loeb and O'Keefe 2006). Tricolored bats have been found regularly in southeastern Minnesota, although never in large numbers in Minnesota (MDNR 2022).
  - During the summer, tricolored bats can be found roosting in trees (MDNR 2022). Woody vegetation in the Site is primarily associated with forest remnants (e.g., along Elk River), woodlot patches, and individual trees. These wooded areas have potential to provide habitat for roosting, traveling, and foraging bats during non-hibernating months (April–October) (MDNR 2022). Therefore, the tricolored bat has potential to occur in the Site, including in the Preliminary Development Area.
- **Monarch butterfly** (*Danaus plexippus*) (candidate). Monarch butterflies occur throughout Minnesota during the summer in open habitats including fields, meadows, weedy areas, marshes, and roadsides (Environmental Conservation Online System [ECOS] 2023). Adult monarch butterflies lay their eggs on milkweed (primarily *Asclepias* spp.). Once eggs hatch, the larvae are dependent on milkweed before emerging as adults (ECOS 2023). Typically, three to four generations overlap mid-May through late October before individuals migrate south to wintering grounds in Mexico (ECOS 2023; Minnesota Seasons 2023).
  - The Site contains roadside ditches and field edges that may provide suitable habitat for monarch butterflies, including areas where milkweed, asters (*Symphyotrichum* spp.), goldenrod, and other flowering plants are found. Because the Site contains suitable habitat for the species, and the species is widespread, monarch butterflies are likely to occur in the Site, including in the Preliminary Development Area.
- **Whooping crane** (*Grus americana*) (experimental population, non-essential)**.** Two whooping crane populations occur in the United States: the experimental, non-essential Eastern Migratory population and the wild Aransas-Wood Buffalo population. Only the Eastern Migratory population range overlaps with Minnesota. The population's summer range is located in central Wisconsin, 200.0 miles southeast of the Site, and individuals migrate to Florida for wintering habitat. Whooping cranes rarely have been documented in Minnesota (Minnesota Conservation Volunteer 2021). The likelihood of this species occurring in the Site is considered low.

There is no designated critical habitat within the Site (Appendix K).

The Bald and Golden Eagle Protection Act protects bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) from intentional take and prohibits disturbance that may lead to biologically significant impacts. The range of both bald and golden eagles overlaps the Site (The Raptor Center 2023; USFWS 2023d, 2023e). Bald eagles may be present on the Site, including in the Preliminary Development

Area, which contains potentially suitable habitat in the form of trees and wooded patches that may be used for roosting, nesting, and perching. No raptor nests were identified in the Site during October 2022 surveys. The Site contains a very limited area of open water sources where bald eagles may forage. Golden eagles may occur in the Site sporadically during migration (The Raptor Center 2023).

4.5.10.1.2 State-Listed Species

Benton Solar requested a MDNR NHIS review in 2023 to determine if significant and rare species, native plant communities, and/or other natural features, may be impacted by the Project. In 2024, Benton Solar requested a second review to ensure it had the most recent data for the current Site. A copy of both reviews are included in Appendix K. The 2023 review indicated that the following four state-listed species may have potential to be impacted by the Project based on the area submitted to the MDNR with Benton Solar's request: Blanding's turtle (*Emydoidea blandingii*) (state threatened), creek heelsplitter (*Lasmigona compressa*) (state species of special concern), loggerhead shrike (*Lanius ludovicianus*) (state endangered), and tubercled rein orchid (*Platanthera flava* var. *herbiola*) (state threatened). The 2024 review indicated that only the Blanding's turtle and creek heelsplitter were of concern, based on the Site submitted with the request.

Benton Solar also reviewed Minnesota's List of Endangered, Threatened, and Species of Special Concern (MDNR 2013), *Minnesota's Wildlife Action Plan 2015–2025* (MDNR 2016b), and the MDNR Rare Species Guide (MDNR 2022) to identify the potential for state-listed species to occur in the Site and/or Preliminary Development Area based on known range, habitat requirements, and/or documented occurrences in Benton County.

Each of these species is summarized in Table 4.5-8. Their potential to occur within the Site and Preliminary Development Area is further discussed below.

Table 4.5-8. State-Listed Species Potentially Occurring in the Site and Preliminary Development Area

Common Name	Scientific Name	State Status	Potential to Occur in the Site and Preliminary Development Area
Birds			
Cerulean warbler	*Setophaga cerulea*	Special concern	May occur
Lark sparrow	*Chondestes grammacus*	Special concern	May occur
Loggerhead shrike*	*Lanius ludovicianus*	Endangered	May occur
Peregrine falcon	*Falco peregrinus*	Special concern	Unlikely to occur
Purple martin	*Progne subis*	Special concern	May occur
Red-shouldered hawk	*Buteo lineatus*	Special concern	May occur
Yellow rail	*Coturnicops noveboracensis*	Special concern	May occur
Mammal			
Plains pocket mouse	*Perognathus flavescens*	Special concern	May occur
Reptiles and Amphibians			
Blanding's turtle*,†	*Emydoidea blandingii*	Threatened	May occur
Gopher snake	*Pituophis catenifer*	Special concern	Unlikely to occur
Insects			
Regal fritillary	*Argynnis idalia*	Special concern	Unlikely to occur

Common Name	Scientific Name	State Status	Potential to Occur in the Site and Preliminary Development Area
Whitney's underwing	*Catocala whitneyi*	Special concern	Unlikely to occur
Fish			
American eel	*Anguilla rostrata*	Special concern	Unlikely to occur
Mussels			
Creek heelsplitter*,†	*Lasmigona compressa*	Special concern	Unlikely to occur
Black sandshell	*Ligumia recta*	Special concern	Unlikely to occur
Plants			
Blunt sedge	*Carex obtusata*	Special concern	May occur
Bog bluegrass	*Poa paludigena*	Threatened	Site - May occur Preliminary Development Area – Unlikely to occur
Butternut	*Juglans cinerea*	Endangered	May occur
Clinton's bulrush	*Trichophorum clintonii*	Threatened	May occur
Drummond's campion	*Silene drummondii* ssp. *Drummondii*	Special concern	May occur
Hill's thistle	*Cirsium pumilum* var. *hillii*	Special concern	May occur
Kinnikinnick dewberry	*Rubus multifer*	Special concern	May occur
Old field toadflax	*Nuttallanthus canadensis*	Special concern	May occur
Tubercled rein orchid*	*Platanthera flava* var. *herbiola*	Threatened	May occur
Vermont bristle-berry	*Rubus vermontanus*	Special concern	May occur

Source: MDNR 2022; Appendix K.
* Species indicated by NHIS 2023 review.
† Species indicated by NHIS 2024 review

Birds

- **Cerulean warblers** (*Setophaga cerulea*). This species prefers mature forests associated with floodplains or wetlands (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 41.2 acres of potentially suitable habitat (i.e., deciduous forest, mixed forest, woody wetlands, and evergreen forest) are present in the Site, and 5.0 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.
- **Lark sparrow** (*Chondestes grammacus*). Lark sparrows typically occur in short and/or sparse grasses (usually native) in areas of sand or gravel soils, with at least some bare ground and widely scattered or patchy trees (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 43.5 acres of potentially suitable habitat (i.e., hay/pasture and herbaceous) are present within the Site, and 10.0 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.
- **Loggerhead shrike**. The 2023 NHIS review indicated that loggerhead shrike has been documented in the vicinity of the Site; the 2024 review did not. This species prefers open grasslands or pastures with short vegetation and scattered shrubs or trees (MDNR 2022). The NHIS review indicated that the loggerhead shrike has been documented near the Site. Approximately 43.5 acres of potentially suitable habitat (i.e., hay/pasture and herbaceous) are present within the Site. Approximately 10.0 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.

- **Peregrine falcon** (*Falco peregrinus*). Peregrine falcons nest primarily on buildings and bridges in urban settings and prefer open, non-forested areas for hunting (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Suitable nesting habitat is not present in the Site. While open areas potentially suitable for hunting may be present in very limited areas of developed land cover, the overall likelihood of the species occurring in the Site is considered relatively low.
- **Purple martin** (*Progne subis*). This species typically nests within human-made structures around human settlements and forages for insects over cities, towns, parks, open fields, streams and rivers, and open water habitats including wetlands, marshes, and lakes (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 72.1 acres of potentially suitable foraging habitat (i.e., hay/pasture, emergent herbaceous wetlands, developed, and herbaceous land cover types) are present within the Site. Approximately 12.3 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.
- **Red-shouldered hawk** (*Buteo lineatus*). This hawk prefers mature forests associated with floodplains or wetlands (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 39.8 acres of potentially suitable habitat (i.e., deciduous forest, woody wetlands, and mixed forest) are present within the Site. Approximately 4.7 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.
- **Yellow rail** (*Coturnicops noveboracensis*). The yellow rail prefers inundated wetlands with sedges, rushes, and prairie cordgrass (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 4.5 acres of potentially suitable habitat (i.e., emergent herbaceous wetlands) are present within the Site. Approximately 0.4 of these acres occur in the Preliminary Development Area. The species has potential to occur in this habitat.

Mammal

- **Plains pocket mouse** (*Perognathus flavescens*). This species is restricted to open, well-drained areas, typically on sandy soils with sparse, grassy or brushy vegetation (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Approximately 43.5 acres of potentially suitable habitat (i.e., hay/pasture and herbaceous) are present within the Site. Approximately 10.0 of these acres occur in the Preliminary Development Area. The species has potential to occur in these habitats.

Reptiles and Amphibians

- **Blanding's turtle**. Both NHIS reviews indicated that Blanding's turtle has been documented in the vicinity of the Site. This species occurs in sandy uplands adjacent to wetland complexes. Calm, shallow waters, including wetlands adjacent to streams and rivers, are especially preferred (MDNR 2022). Due to the presence of suitable habitat in the form of wetlands, and the known occurrence of this species in the vicinity of the Site, this species may occur in the Site.
- **Gopher snake** (*Pituophis catenifer*). This snake occurs in well-drained, loose sandy and gravel soils with dry sand prairies and bluff prairie habitats preferred (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Very limited potentially suitable habitat occurs in the Site (0.3 acre of herbaceous land cover) or Preliminary Development Area (less than 0.1 acre of herbaceous land cover). Therefore, this species is unlikely to occur within the Site.

Insect

- **Regal fritillary** (*Argynnis idalia*). This species is associated with native prairie habitat (MDNR 2022). Whitney's underwing (*Catocala whitneyi*) occurs in dry to mesic prairies and savanna where leadplant (*Amorpha canescens*) occurs (MDNR 2022). The NHIS reviews did not indicate presence of native plant communities, including mesic prairies, in the Site and approximately 99.2% of the Preliminary Development Area is developed or agricultural. Therefore, these species are unlikely to occur within the Site.
- **Whitney's underwing** (*Catocala whitneyi*). The Whitney's underwing occurs in dry to mesic prairies and savanna where leadplant (*Amorpha canescens*) occurs (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Suitable habitat is not present in the Site and the species is unlikely to occur there.

Fish

- **American eel** (*Anguilla rostrata*). The American eel prefers moderate- or large-sized rivers that have continuous flow and a mud or rock bottom (MDNR 2022). This species primarily is found in the lower Mississippi River and its larger tributaries, such as the St. Croix and Minnesota Rivers (University of Minnesota 2002). The Elk River and an unnamed stream occur in the Preliminary Development Area, but the NHIS reviews did not indicate an occurrence of the species in the vicinity of the Site. Because approximately 99.2% of the Preliminary Development Area is developed or agricultural, any suitable habitat if present would be extremely limited (i.e., only 0.1 mile of flowlines occur in the Preliminary Development Area). Therefore, the American eel is unlikely to occur within the Preliminary Development Area.

Mussels

- **Creek heelsplitter**. The 2023 NHIS review indicated that creek heelsplitter has been documented in the Redeye River. The Redeye River, at its closest point, is located 73.0 miles northwest of the Site. The 2024 review indicated the species has been documented in the Elk River in the vicinity of the Site. This species typically occurs in creeks, small rivers, and the upstream portions of large rivers (MDNR 2022). Because 99.2% of the Preliminary Development Area is developed or agricultural, any suitable habitat for mussel species, if present, would be extremely limited (i.e., only 0.01 mile of flowlines occur in the Preliminary Development Area). Therefore, the creek heelsplitter is unlikely to occur within the Preliminary Development Area.
- **Black sandshell** (*Ligumia recta).* This species is typically found in the riffle and run areas of medium to large rivers (MDNR 2022). The Elk River and an unnamed stream occur in the Preliminary Development Area, but the NHIS reviews did not indicate an occurrence of the species in the Site. Because 99.2% of the Preliminary Development Area is developed or agricultural, any suitable habitat for mussel species, if present, would be extremely limited (i.e., only 0.01 mile of flowlines occur in the Preliminary Development Area). Therefore, the black sandshell is unlikely to occur within the Preliminary Development Area.

Plants

- **Blunt sedge** (*Carex obtusata*). This sedge occurs in native grasslands that have developed on dry, sandy, or gravelly soil (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat is present within the Site in the form of herbaceous land cover (0.3 and less than 0.1 acre in the Site and Preliminary Development Area, respectively). Although potentially suitable habitat is highly limited, the species may occur.

- **Bog bluegrass** (*Poa paludigena*). This species occurs only in forested wetland habitats that are maintained by groundwater seeps (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat may be present in the Site in the form of woody wetlands (3.7 acres in the Site, less than 0.1 of which is located in the Preliminary Development Area). Therefore, this species has potential to occur in the Site but is unlikely to occur in the Preliminary Development Area.
- **Butternut** (*Juglans cinerea*). This species most commonly occurs on river terraces elevated several feet or more above active floodplains, where it is protected from siltation and flood scouring (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat associated with the Elk River or the unnamed stream may be present in the Site (including the Preliminary Development Area), and the species has potential to occur there.
- **Clinton's bulrush** (*Trichophorum clintonii*). Clinton's bulrush occurs in a variety of habitats. In southeastern Minnesota, the species occurs in prairie or savannah communities and sometimes in openings or edges of fire-dependent forests. In northwestern Minnesota, this species occurs in aspen parkland communities, which are also fire dependent (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat is present within the Site in the form of herbaceous land cover (0.3 and less than 0.1 acre in the Site and Preliminary Development Area, respectively). Although potentially suitable habitat is highly limited, the species may occur.
- **Drummond's campion** (*Silene drummondii* ssp. *Drummondii*). Drummond's campion occurs in relatively high-quality native plant communities with dune, savanna, barren, or pine woodland habitats. This species does not occur on roadsides, agricultural land, gravel pits, or other disturbed habitats (MDNR 2022). The NHIS reviews did not indicate presence of native plant communities or of the species in the Site. Potentially suitable habitat in the form of herbaceous land cover (0.3 and less than 0.1 acre in the Site and Preliminary Development Area, respectively) or evergreen forest (1.3 and 0.3 acres in the Site and Preliminary Development Area, respectively) is present but very limited. However, the species has potential to occur.
- **Hill's thistle** (*Cirsium pumilum* var. *hillii*). This species typically occurs on level outwash plains, river terraces, and rolling terrain formed of glacial till (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat associated with the Elk River or the unnamed stream may be present in the Site (including the Preliminary Development Area), and the species has potential to occur there.
- **Kinnikinnick dewberry** (*Rubus multifer*). This species occurs in high-quality savanna remnants on the Anoka Sandplain Subsection and elsewhere on a few bedrock exposures in prairie habitats (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat is present in the form of herbaceous land cover (0.3 and less than 0.1 acre in the Site and Preliminary Development Area, respectively). Although potentially suitable habitat is highly limited, the species may occur.
- **Old field toadflax** (*Nuttallanthus canadensis*). Old field toadflax occurs in dry and sandy soil in prairies, barrens, dunes, and savannas (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Potentially suitable habitat is present in the form of herbaceous land cover (0.3 and less than 0.1 acre in the Site and Preliminary Development Area, respectively). Although potentially suitable habitat is highly limited, the species may occur.
- **Tubercled rein orchid**. The 2023 NHIS review indicated that tubercled rein orchid has been documented in the vicinity of the Site; the 2024 review did not. This species occurs in moist or wet meadows or sunny swales in savannas and prefers sandy or peaty habitats along marshes, lakeshores, swamps, and wet prairies and meadows (MDNR 2022). Only 0.4 acre of emergent

herbaceous wetlands are found in the Preliminary Development Area. However, due to the presence of this potentially suitable habitat, and the known occurrence of the species near the Site, this species may occur in the Site or Preliminary Development Area.

- **Vermont bristle-berry** (*Rubus vermontanus*). This species occurs in partially wooded habitats and woodland edges, particularly where edges constitute ecotones between uplands and lowlands (MDNR 2022). The NHIS reviews did not indicate a documented record for the species in the Site. Suitable habitat may be present in the form of forest and wooded areas and woodland edges in the Site or the Preliminary Development Area. Therefore, the species may occur there.

4.5.10.1.3 Minnesota Biological Survey Sites of Biodiversity Significance and MDNR Native Plant Communities

MBS collects, monitors, interprets, and provides data on animal and plant distribution, as well as ecology of functional landscapes and native plant communities (sites of biodiversity significance) (MDNR 2016b, 2023i). These sites of biodiversity significance are ranked (outstanding, high, moderate, and below) based on the size and condition of native plant communities within the Site, presence of rare species populations, and the landscape context of the Site (MDNR 2023i). The NHIS reviews indicated an area ranked as "below" intersects a very small portion of the Site (see Figure 7). Areas ranked as "below" are areas the MBS considered for sites of biodiversity significance and determined to be below the minimum biodiversity threshold for statewide significance (see Appendix K). There are no "high" or "moderate" sites of biodiversity within the Site, and no sites of biodiversity significance within the Preliminary Development Area.

Native plant communities are described and classified using the characteristics of vegetation, landforms, hydrology, natural disturbance regimes, and soils of a given area. Native prairies (grasslands that have never been plowed) in Minnesota are a particular concern because more than 99% of native prairie has been destroyed (MDNR 2016b). The NHIS reviews did not indicate known presence of native plant communities in the Site.

4.5.10.1.4 Calcareous Fens

Calcareous fens are wetlands formed by groundwater that are easily harmed from changes to water quantity and quality (MDNR 2016a). These rare wetlands are protected by Minn. Stat. § 103G.223. According to data obtained from the MDNR, there are no calcareous fens in the Site (MDNR 2023j).

4.5.10.1.5 Large Block Habitats and Other Important Habitats

Large block habitats are habitat types (e.g., forest or prairie) greater than 40.0 acres. These areas can provide habitat for an increase in populations of wildlife, higher diversity, and more complex and resilient ecological communities (MDNR 2023a). The Site and Preliminary Development Area are highly fragmented, and 95.2% and 99.2%, respectively, of each of the areas is developed or used for agriculture. According to data obtained from the MDNR, there are no regionally significant ecological areas or public/private conservation easements within the Site. However, portions of large block habitats (i.e., contiguous forested areas) do occur within the Site and Preliminary Development Area (MDNR 2008, 2015, 2023i, 2023k).

4.5.10.2 IMPACTS AND MITIGATION

4.5.10.2.1 Federally Listed and Protected Species

Migrating, foraging, and roosting individual northern long-eared and tricolored bats have potential to occur during spring, summer, or fall in the Site. Benton Solar will avoid and minimize tree clearing to the extent practicable. Where tree clearing cannot be avoided, Benton Solar will implement seasonal clearing restrictions during the summer season (May 15–August 31) as recommended by USFWS to minimize direct effects. If occurring in the Site during the same time and space as Project construction activities, individual bats may be temporarily disturbed by human presence or noise. However, such disturbance would be insignificant and similar to current human presence and noise associated with residences and agricultural activities.

The monarch butterfly may use suitable habitat in the Site for foraging, rearing, and flight. Habitat removal and modification during Project construction would result in: 1) short-term impacts where habitat is removed or converted for construction only; or 2) long-term impacts where habitat is converted for the life of the Project or replaced by Facilities. Monarch butterflies often inhabit disturbed areas exposed to human activity. Benton Solar anticipates that monarch butterflies would continue to use habitat exposed to short-term disturbances related to Project construction and O&M or would use adjacent habitat. Monarch butterflies could be injured or killed through collisions with or crushing by construction or personal vehicles or workers. Construction and O&M personnel would observe a reduced speed limit of 25.0 miles per hour (40.0 kilometers per hour) while driving in the Site. Personnel would operate vehicles consistent with posted speed signs and typical traffic on public roads. Due to reduced speeds in the Site, adult monarch butterflies are expected to be able to avoid collisions with vehicles in most instances. On public roadways, risk of collision with vehicles would not represent a change to existing conditions. Butterfly eggs, larvae, and pupae have potential to be crushed by vehicles operating or by personnel in the Preliminary Development Area. However, the Project is expected to provide a net benefit to monarch butterflies as up to 614.5 acres will be converted from primarily agricultural land to regionally appropriate vegetation (see Appendix D). This vegetation would provide potentially suitable breeding, rearing, foraging, and sheltering habitat for monarchs. Vegetation establishment is expected to occur within the first three growing seasons following permanent seed installation (see Appendix D).

The range of both bald and golden eagles overlaps the Site, and bald eagles may be present as the Site and Preliminary Development Area contain suitable habitat for bald eagles in the form of remnant forests and smaller wooded patches that may be used for roosting, nesting, and perching. Golden eagles may occur in the Preliminary Development Area sporadically during migration.

4.5.10.2.2 State-Listed Species

The 2023 NHIS review indicated four species with potential to be impacted by the Project: Blanding's turtle, creek heelsplitter, loggerhead shrike, and tubercled rein orchid (see Appendix K). The 2024 review indicated only the Blanding's turtle and creek heelsplitter had potential to be impacted, based on the current Site. To be conservative of state-listed species, Benton Solar addresses all four species in this Application.

Direct fatalities and habitat disturbance from construction and Project-related activities could impact Blanding's turtle via the same pathways described in Section 4.5.8. The NHIS reviews provided the following required avoidance measures for Blanding's turtle, which Benton Solar will implement:

- Avoid aquatic impacts during hibernation season (September 15–April 15), unless the area is unsuitable for hibernation.

- Limit erosion control blanket use to "bio-netting" or "natural netting" types, and specifically do not use products containing plastic mesh netting or other plastic components.
    - Benton Solar is aware that other hydro-mulch products may contain small synthetic (plastic) fibers to aid in their matrix strength. The loose fibers could potentially resuspend and make their way to public waters. Benton Solar will avoid using such products in areas of potentially suitable Blanding's turtle habitat.
- Benton Solar will investigate potentially suitable habitat areas, particularly aquatic areas, prior to the use of heavy equipment or any ground disturbance in these areas.
    - Benton Solar will distribute the Blanding's turtle flyer (MDNR 2008) to all contractors working in such areas.
    - Benton Solar will monitor for Blanding's turtles during construction in such areas and will report any sightings to the MDNR nongame specialist.
    - Benton Solar will avoid further activity and first coordinate with the MDNR nongame specialist to move individual turtles if they are observed and in imminent danger.

Benton Solar will avoid and minimize impacts to perennial aquatic resources through implementation of standard construction BMPs (e.g., erosion control measures). Additionally, Benton Solar will use HDD to bore below the Elk River to avoid impacts to this resource. Therefore, Benton Solar does not anticipate that any impacts will occur to the creek heelsplitter if present within the Site.

Generally, the Project has potential to impact avian species as described in Section 4.5.8.2. Loggerhead shrikes may be present in the Site. To avoid impacts to nesting individuals, if present, Benton Solar will avoid tree and shrub removal in suitable nesting habitat during the breeding season (April–July). In addition, Benton Solar and its contractors will report species sightings to MDNR's regional nongame specialist.

Benton Solar will avoid potentially suitable habitat for the tubercled rein orchid to the extent practicable. Per NHIS 2023 recommendations and where avoidance is not practicable, Benton Solar will complete a habitat assessment of wetlands and undisturbed upland areas within 100.0 feet of wetlands that may be impacted by the Project before beginning construction activities in these areas. Benton Solar will avoid observed individuals or populations.

Benton Solar expects that, due to implementation of measures described above, no impacts to state-listed species will occur as a result of the Project.

4.5.10.2.3 Minnesota Biological Survey Sites of Biodiversity Significance and MDNR Native Plant Communities

The NHIS reviews indicated an MBS area ranked as "below" intersects a very small portion of the Site. These are areas that the NHIS has determined are below minimum biodiversity threshold for statewide significance (see Appendix K). No native plant communities or conservation opportunity areas are present in the Site. Therefore, Benton Solar does not anticipate impacts to these resources.

4.5.10.2.4 Calcareous Fens

There are no calcareous fens in the Site. Therefore, no impacts to this resource will occur.

4.5.10.2.5 Large Block Habitats and Other Important Habitats

Wooded areas that are part of a forested large block habitat are present in the Site and in the Preliminary Development Area. Benton Solar has designed the preliminary site plan to maximize use of lands already

disturbed (e.g., cropland). Up to 10.1 acres of forested land cover will be removed within the Site to accommodate construction of the Project substation, to establish HDD boring entry points and access to those entry points, and to address shading concerns. In most areas, forest remnants have been avoided (see Figure 3). Because Benton Solar will avoid and minimize tree clearing to the extent practicable, the Applicant does not anticipate impacts to this resource and no mitigation measures are proposed.

4.6 Potential Cumulative Impacts

4.6.1 Existing Conditions

According to Minn. R. 2210.0200, subp. 11, cumulative impacts are impacts on the environment caused by incremental effects of a project in addition to other past, present, or reasonably foreseeable future projects, regardless of what person or entity undertakes those projects. While a project itself may cause minor impacts, those impacts may be more significant when considered together with impacts of other projects.

Benton Solar has consulted with regional and local agencies throughout the development phase of the Project and conducted outreach for the Project (Section 5). Benton Solar is aware of the Regal Solar Project, located 18.0 miles to the northwest of the Project in Benton County. The Regal Solar Project was issued a Site Permit in 2021 and has been undergoing interconnection studies as of December 2022 with no progress to construction yet. No additional information has been identified during Benton Solar's agency or public outreach regarding other existing or planned solar energy generation projects in Benton County. Benton Solar has designed the Project to accommodate potential future expansion of the Project or interconnection of an adjacent, separate project. However, any such expansion or construction of a separate project, including additional infrastructure that may be required, will be addressed and permitted separately in the future. Benton Solar also reviewed the Benton County website (Benton County 2023c) and identified that the Land Services Director for the County Board discussed the Project on August 16 and September 6, 2022. The MnDOT District 6 projects (MnDOT 2024) identified no activities near the Site for the 2024 season.

4.6.2 Impacts and Mitigative Measures

Cumulative impacts related to Project construction are unlikely to occur. The Regal Solar Project is expected to begin construction as early as 2024. Potential cumulative impacts associated with the operational life of both the Project and the Regal Solar Project include aesthetic changes, land use changes, and infrequent vehicle travel to and from the sites. Mitigation measures designed to minimize contributing impacts from the Project include Site restoration and implementation of BMPs outlined in the SWPPP, VMP, and AIMP. Cumulative effects, if any, are expected to be beneficial due in part to improved socioeconomic conditions from employment opportunities, direct spending during Project construction, increased tax revenue, and reduction in emissions as compared to the use of similarly sized fossil fuel energy facilities that emit GHGs and other air pollutants. Because no adverse impacts as a result of cumulative effects are anticipated, Benton Solar does not propose mitigation measures.

4.7 Unavoidable Impacts

To the extent practicable, the Project has been sited and designed to avoid adverse effects on the natural environment. Impacts are not entirely avoidable, and Benton Solar will implement mitigation measures as necessary to minimize the long-term effects of these impacts.

4.7.1 Impacts and Mitigative Measures

The majority of the unavoidable impacts would be short-term and would occur during Project construction. Primary unavoidable impacts associated with Project construction include construction traffic, noise, and dust; wildlife displacement; and exposed soils with the potential for erosion and sedimentation due to grading activities. Primary unavoidable impacts anticipated for the life of the Project include aesthetic changes, land use changes, and infrequent vehicle travel to and from the Project. Mitigative measures to minimize impacts from the Project include Site restoration and implementation of BMPs outlined in the SWPPP, VMP, and AIMP.

5 AGENCY, TRIBAL, AND PUBLIC OUTREACH

This section describes the Applicant's outreach efforts as well as federal, state, and local agency; tribal; and public involvement in the pre-application process. The Applicant also made efforts to solicit stakeholder and landowner opinions, concerns, and feedback regarding the Project.

On April 13, 2023, Benton Solar sent a letter describing the Project and Site to certain federal, state, and local agencies. The letter was sent in advance of this Application submittal. A representative letter and substantive responses received as of June 13, 2023, are included in Appendix A. Table 5-1 provides a summary of significant communication with federal, state, and local agencies and the public in chronological order.

Benton Solar also conducted outreach to 47 Native American Tribes for the Benton Solar Project. Tribal outreach efforts are provided in Appendix I3, Table I3-1. Initial outreach consisted of a letter sent to each Tribe's Tribal Historic Preservation Officer (THPO) or similar representative on October 22, 2022, by Benton Solar's Tribal and Indigenous Relations group, providing information on the Project and surrounding area (Attachment H1-1). The outreach letter provided an opportunity to receive additional information on the Project and opportunities to participate in fieldwork to identify and avoid sensitive tribal resources. The Mille Lacs Band of Ojibwe and the Rosebud Sioux Tribe responded, indicating interest in the Project. The Crow Creek Sioux Tribe responded indicating no interest in the Project, and the Shakopee Mdewakanton Sioux Community responded that they would defer to Tribes closer to the Project. Benton Solar requested that SWCA conduct additional outreach with five Tribes (the Mille Lacs Band of Ojibwe, the Rosebud Sioux Tribe, the Sisseton Wahpeton Oyate, the Standing Rock Sioux Tribe, and the Upper Sioux Community) for potential fieldwork; all five provided tribal specialists to participate in some or all fieldwork. On August 10, 2023, NEER sent a second outreach letter to provide a Project update to the 11 Minnesota Tribal Nations and to those Tribes outside Minnesota that requested continued involvement in the Project. This letter provided a Project update and included sensitive and confidential cultural resources information. Due to the sensitive nature of that content, the letter has been redacted and is not included in Appendix I3-1. Coordination with Tribes is ongoing.

The Applicant will continue the collaborative process with agencies, Tribes, and other stakeholders throughout the development, construction, and operation phases of the Project.

Table 5-1. Agency and Public Coordination Dates and Correspondence

Date	Entity	Event and Participants
September 6, 2022	Benton County Commission	Meeting to provide Project overview and updates. Participants were Jared J. Gapinski, Steve Heinen, Scott Johnson, Ed Popp, and Beth Schlangen, Benton County Commission; Brittney Paxson, Benton Solar, LLC (Benton Solar).

Date	Entity	Event and Participants
Summer 2022	Benton County Planning and Zoning	Meeting to provide Project overview and updates. Participants were Roxanne Achman, Chris Byrd, and Sierra Cotter, Benton County Planning and Zoning; Brittney Paxson, Danell Herzig, and Tom Vonbische, Benton Solar.
November 30, 2022	Benton County Planning and Zoning	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Roxanne Achman, Benton County Planning and Zoning; Brittney Paxson and Danell Herzig, Benton Solar.
November 30, 2022	Participating and signed landowners; Benton County Commission	Dinner meeting to discuss Project overview, updates, and next steps. Participants included the participating and signed landowners; Scott Johnson and Ed Popp, Benton County Commissioners; Brittney Paxson, Danell Herzig, Tom Vonbische, Greg Martinez, Kim Duursma, Derek Hood, Todd Cummins, and Steven Davidson, Benton Solar.
December 1, 2022	St. Cloud Planning and Zoning	Meeting to discuss Project overview and where the Site is located in relation to city expansion plans. Participants were Matt Glaesman, City of St. Cloud Planning and Zoning; Brittney Paxson and Danell Herzig, Benton Solar.
December 2, 2022	Benton Economic Partnership	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Amanda Othoudt, Benton Economic Partnership; Brittney Paxson and Danell Herzig, Benton Solar.
December 3, 2022	Benton County Sheriff	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Troy Heck, Benton County Sheriff; Brittney Paxson and Danell Herzig, Benton Solar.
February 7, 2023	Benton County Commission	Meeting to discuss Project overview and updates. Participants were Scott Johnson, Ed Popp, Steve Heinen, Jared J. Gabinski, and Beth Schlangen, Benton County Commission; Brittney Paxson and Danell Herzig, Benton Solar.
February 7, 2023	Gabriel Media	Meeting to discuss marketing and sponsorship opportunities that the City of St. Cloud Chamber of Commerce offers. Participants were Dustin Guggenberger, Gabriel Media; Brittney Paxson and Danell Herzig, Benton Solar.
February 7, 2023	Townsquare Media	Meeting to discuss marketing and sponsorship opportunities that Townsquare Media offers. Participants were John Schroeder, Townsquare Media; Danell Herzig and Brittney Paxson, Benton Solar.
February 7, 2023	Benton Economic Partnership	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Amanda Othoudt, Benton Economic Partnership, Inc.; Danell Herzig and Brittney Paxson, Benton Solar.
February 14, 2023	Minden Township Board	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Cynthia Abraham, Pam Benoit, Mark Ebnet, Steve Simones, Minden Township Board; Danell Herzig, Greg Martinez, Brittney Paxson, Benton Solar.
February 15, 2023	Benton County Planning and Zoning	Meeting to review status of the Project and to go through Application details. Participants were Roxanne Achman, Benton County Planning and Zoning; Danell Herzig and Brittney Paxson, Benton Solar.
March 14, 2023	St. George Township Board	Meeting to discuss Project overview, updates, and how to get involved with the community. Participants were Bradley Chmielewski, Patrick Herbst, Jeremy Johnson, Nicole Leabch, and Donald Martin, St. George Township Board; Danell Herzig, Greg Martinez, and Brittney Paxson, Benton Solar.
April 13, 2023	U.S. Army Corps of Engineers	Letter from Brittney Paxson, Benton Solar, describing Project and requesting comments.
	U.S. Fish and Wildlife Service	
	Minnesota State Historic Preservation Office (SHPO)	

Date	Entity	Event and Participants
	Minnesota Department of Natural Resources (MDNR)	
	Minnesota Department of Health	
	Minnesota Department of Agriculture	
	Minnesota Department of Transportation (MnDOT)	
	Minnesota Department of Employment & Economic Development	
	Minnesota Pollution Control Agency	
	Minnesota Department of Public Safety	
	Minnesota Board of Water and Soil Resources (BWSR)	
	Benton County Planning and Zoning Department	
	St. Cloud Planning and Zoning Department	
	Benton County Sheriff	
	Benton County Commissioners	
	Benton Economic Partnership	
	Benton County Highway Department	
	Minden Township	
April 13, 2023	MDNR, Ecological and Water Resources	Email from Melissa Collins, MDNR to Brittney Paxson, Benton Solar in response to April 13, 2023, request for comments.
April 13, 2023	MDNR, Lands and Minerals Division	Email from Martha Vickery, MDNR to Brittney Paxson, Benton Solar in response to April 13, 2023, request for comments.
April 14, 2023	SHPO	Email from Kelly Gragg-Johnson, SHPO to Brittney Paxson, Benton Solar in response to April 13, 2023, request for comments.
April 17, 2023	BWSR	Emails from Cade Steffenson and Sierra Cotter, BWSR to Brittney Paxson, Benton Solar in response to April 13, 2023, request for comments.
April 18, 2023	MnDOT	Email from Stacy Kotch Egstad, MnDOT to Brittney Paxson, Benton Solar in response to April 13, 2023, request for comments.
April 18, 2023	Benton County Commissioners	Meeting to discuss the Project overview, updates, and how to get involved with the community. Participants were Jared J. Gabinski, Steve Heinen, Scott Johnson, Ed Popp, and Beth Schlangen, Benton County Commissioners; Brittney Paxson, Benton Solar.
April 20, 2023	Landowners within the Site	Dinner meeting to discuss the Project overview, updates, and how to get involved with the community. Participants were Site landowners; Brittney Paxson, Benton Solar.
April 20, 2023	Foley Area Chamber of Commerce	Event meeting to discuss the Project overview, updates, and how to get involved with the community. Participants were Foley Area Chamber of Commerce members; Brittney Paxson, Benton Solar.

Date	Entity	Event and Participants
May 3, 2023	Big Brothers Big Sisters of Central Minnesota	Follow-up meeting from the Foley Area Chamber of Commerce meeting to discuss and create sponsorship opportunities. Participants were Emmitt Edwards, Big Brothers Big Sisters of Central Minnesota; Brittney Paxson and Adam Gracia, Benton Solar.
June 18, 2023	Benton County Commissioners and Engineers	Meeting to discuss solar panel and collection layout. Participants were Benton County Commissioners; Chris Byrd; and Adam Gracia, Liam Hoey, and Annie Peters, Benton Solar.
August 30, 2023	Landowners within the Project receiving panels	Presentation and dinner to discuss preliminary panel layout. Participants were Kurt Adelman; Allen Bauerly; George and Marjorie Besser; Larry and Lorin Besser; Kevin and Aimee Boos; John and Julie Jurek-Svihel; James Smale; members of the McIver Family Trust; and Kim Duursma, Julia Fasano, Adam Gracia, John Lewis, Cody MacDonald, Brittney Paxson, Annie Peters, and Rob Peterson, Benton Solar.
November 7, 2023	Benton County Board	Meeting to discuss solar panel and collection layout and proposed road use. Participants were Benton County Commissioners; and Adam Gracia, Benton Solar.
January 25, 2024	Benton Economic Partnership Inc.	Meeting to discuss Project overview, timeline, and community engagement. Participants were Amanda Othoudt, Benton Economic Partnership Inc.; and Adam Gracia, Benton Solar.
April 8, 2024	Big Brothers Big Sisters of Central Minnesota	Meeting to discuss and renew sponsorship opportunities. Participants were Emmitt Edwards, Big Brothers Big Sisters of Central Minnesota; and Adam Gracia and Matt Johnson, Benton Solar.
April 24, 2024	Foley Quality of Life Task Force	Email from Adam Gracia, Benton Solar to Melissa Kloss-Lezer, Foley Quality of Life Task Force to discuss renewed sponsorship opportunities for the Foley Quality of Life Task Force.
April 26, 2024	City of St. Cloud Planning and Zoning	Email from Adam Gracia, Benton Solar to David Broxmeyer, Matt Glaesman and Isabella Margl, City of St. Cloud Planning and Zoning to communicate the intended 911 address for the Project.
April 30, 2024	Benton County Board	Meeting to discuss proposed road use, Project timeline, and battery energy storage system. Participants were Benton County Commissioners; and Adam Gracia, Benton Solar.
May 17, 2024	City of St. Cloud Planning and Zoning Emails	Email from Adam Gracia, Benton Solar to Matt Glaesman and Isabella Margl, City of St. Cloud Planning and Zoning to communicate Project plans in the St. Cloud/Minden Township Orderly Annexation Area and ensure the Project complies with the City's land use and zoning plans.
May 28, 2024	Landowners	Meeting to discuss Project updates and timeline. Participants were Site landowners; Jonas van Stappen, Kimberly Duursma, Sophia Donovan, John Lewis, Alec Mazzuco; and Adam Gracia, Benton Solar.
June 6, 2024	City of St. Cloud Planning and Zoning	Meeting to discuss how the Project aligns with the City of St. Cloud/Minden Township Orderly Annexation Area land use and zoning plans. Participants were Matt Glaesman, City of St. Cloud Planning and Zoning; and Adam Gracia and Cody MacDonald, Benton Solar.
July 16, 2024	Benton County Commissioners	Meeting to discuss Project update and overview of battery energy storage site. Participants were Benton County Commissioners; and John Farley, Adam Gracia, and Cody MacDonald, Benton Solar.
August 14, 2024	Landowner Open House	Open house to provide Project updates. Participants were landowners in and adjacent to the Project Site; and Adam Gracia, Benton Solar.
August 14, 2024	Benton County Emergency Management	Meeting to discuss Project. Participants were Kristen Tschida, Benton County Emergency Management Director; and Josh Adams, Sophia Donovan, John Farley, Adam Gracia, and Evan Shea, Benton Solar.

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