# APPENDIX C

# Agricultural Impact Mitigation Plan

# Agricultural Impact Mitigation Plan for the Benton Solar Project in Benton County, Minnesota

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

**AUGUST 2024**

PREPARED FOR

**Benton Solar, LLC**

PREPARED BY

**SWCA Environmental Consultants**

# AGRICULTURAL IMPACT MITIGATION PLAN FOR THE BENTON SOLAR PROJECT IN BENTON COUNTY, MINNESOTA

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# CONTENTS

## Appendix



## Figures



## Tables

# 1 INTRODUCTION AND PURPOSE

Benton Solar, LLC (Benton Solar), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC, 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 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) (Table 1-1). Facilities include all temporary and permanent features associated with the Project. Benton Solar anticipates a commercial operations date by the fourth quarter of 2027.

This agricultural impact mitigation plan (AIMP) identifies measures 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 eventual decommissioning of the Project. Implementation of these measures is also intended to ensure that lands within the Site are available for preconstruction uses following Project decommissioning.

**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 |
| Electrical collection system | 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 |

[1] All measurements presented in this plan are approximate and have been rounded to the nearest tenth.

[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 0.5 mile) exceed the thresholds provided in the definition.

| Facility | Acres* | |
|---|---|---|
| | **Long-term Impacts** | **Short-term Impacts∞** |
| 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. It is included here for totality of the Project description.

∞ Disturbances will be short-term, and areas will be restored as described in the Benton Solar's Joint Site Permit Application (Commission Docket Nos. IP7115/GS-23-423 and IP7115/ESS-24-283) following completion of construction.

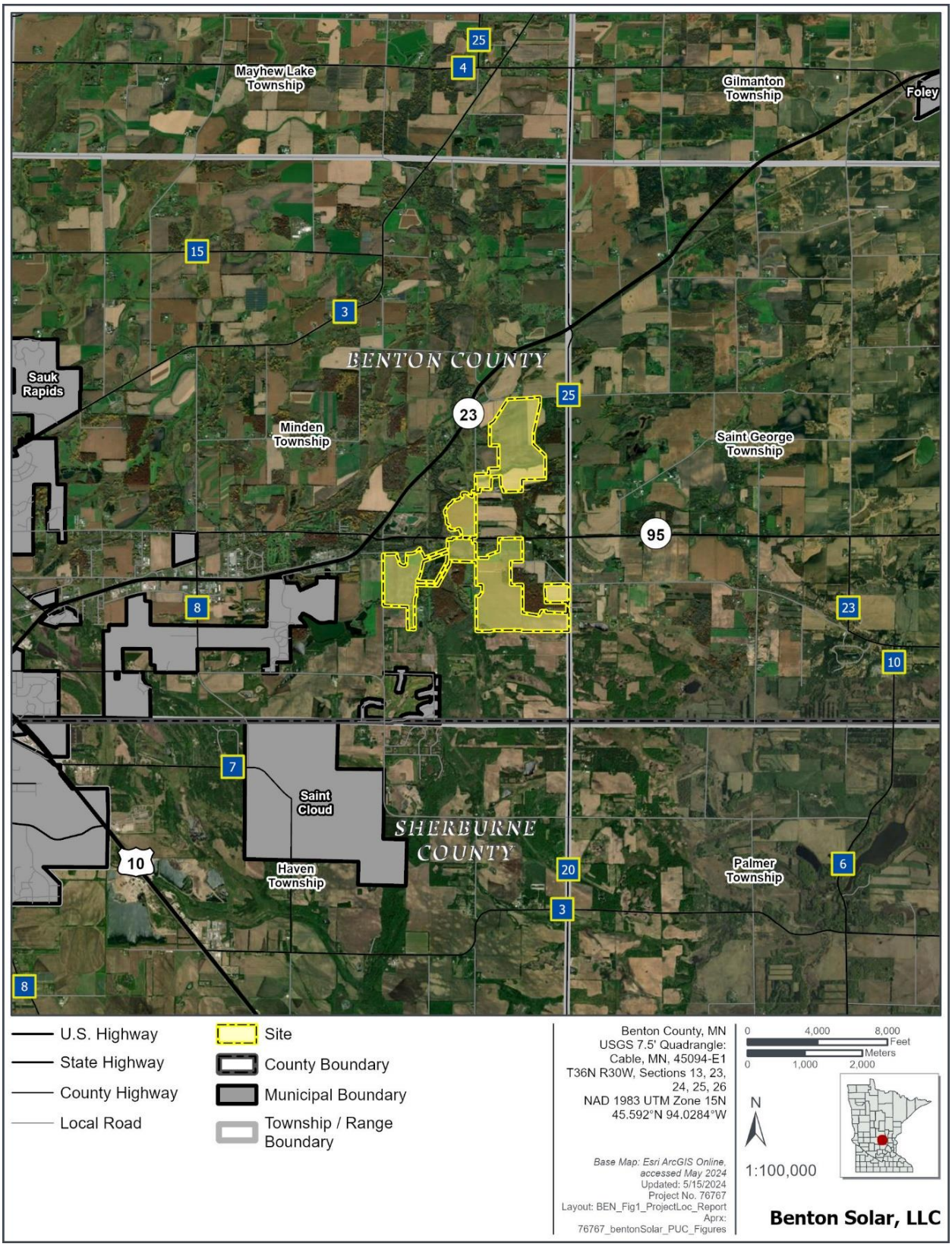


**Figure 1. Project location.**

# 2 PROJECT DESCRIPTION

All land currently within the Site is privately owned. The Site is located in Township 36 North, Range 30 West, Sections 13 and 23–26. The center point of the Site is located at 45.588434°N, -94.02556°W.

Benton Solar will own or lease all lands within the Site. Benton Solar will execute lease options or purchase land rights to acquire private property required for the Project, in accordance with state and federal land acquisition requirements. Land rights will be recorded as part of the public record. Agricultural activity will cease within the Preliminary Development Area until the Project is decommissioned. However, for lands under lease within the Site and outside the Preliminary Development Area, landowners have the option to continue agricultural practices throughout the life of the Project.

The Site, for which Benton Solar will have full Site control, is sufficient to accommodate the Facilities and setback requirements (Figure 2). The Project will be constructed, operated, and decommissioned in adherence with the applicable local, state, and federal regulations, including those related to agricultural, and specifically prime farmland, impacts.

## 2.1 Project 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, which 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.

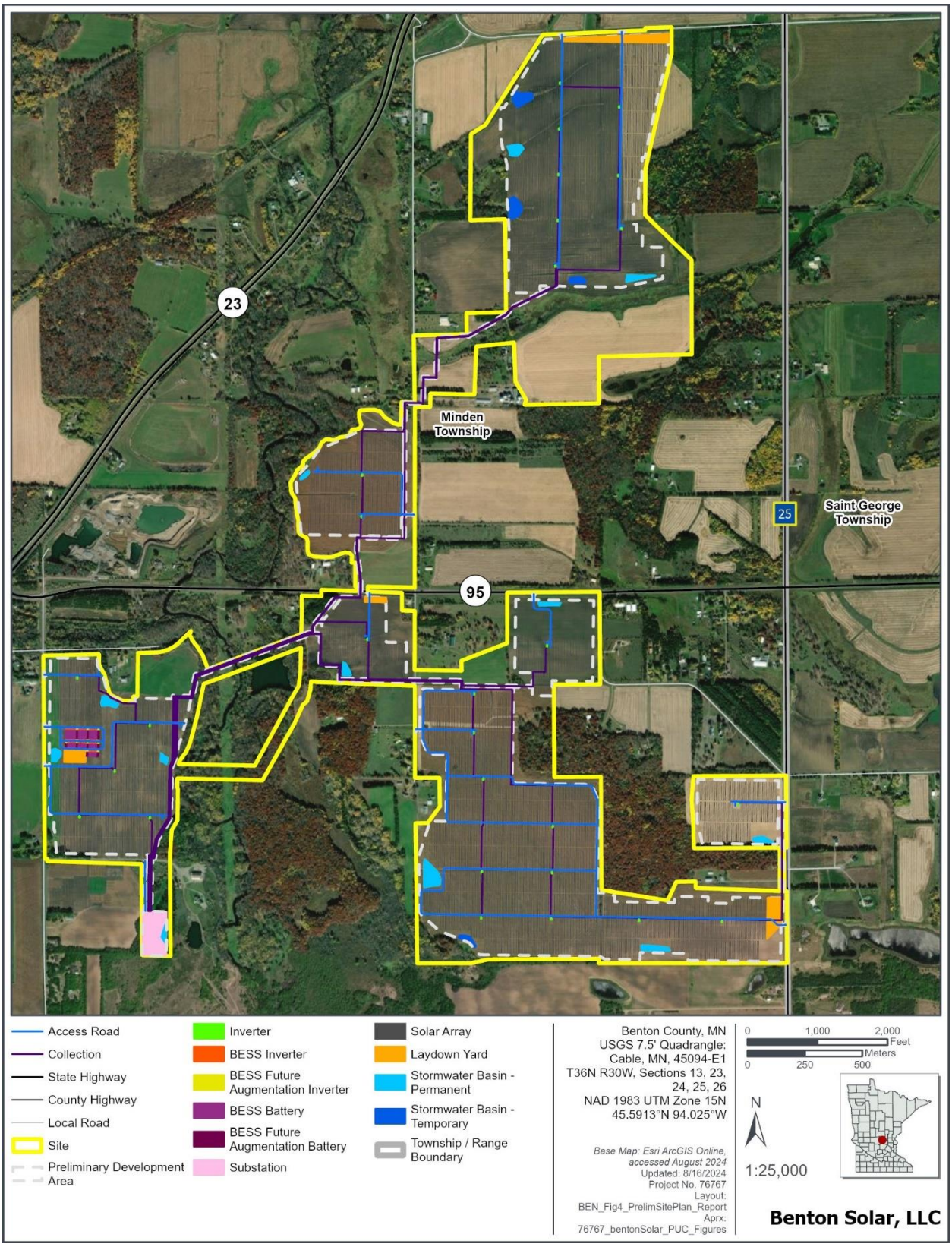


**Figure 2. Benton Solar preliminary site plan.**

## *2.1.1 Photovoltaic Arrays*

### 2.1.1.1 PANELS

The Project's solar arrays will use multiple photovoltaic (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. 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.

### 2.1.1.2 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 the Joint Site Permit 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.

### 2.1.1.3 POWER CONVERSION UNITS

Inverters, medium-voltage transformers, and air conditioning units will be contained within metal structures called PCUs. 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.

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. Trenching, plowing, boring, excavation, and grading activities will follow the Project AIMP and best management practices (BMPs) outlined in the Project stormwater pollution prevention plan (SWPPP) to minimize impacts to existing vegetation and topsoil.

## 2.1.2 Battery Energy Storage System

### 2.1.2.1 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. A BESS's capacity 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.

### 2.1.2.2 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). 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).

### 2.1.2.3 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.

#### 2.1.2.4 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.

#### 2.1.2.5 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.

### *2.1.3 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 2 shows the electrical collection system location at the time of the Joint Site Permit 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.

### *2.1.4 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. 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.

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.

### 2.1.5 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 (Minnesota Department of Natural Resources 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.

### 2.1.6 Substation and Transmission Line

The substation will be a 34.5/115-kV step-up substation with metering and switching equipment. It will be designed according to regional utility practices, including the Midcontinent Independent System Operator (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 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 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.

### 2.1.7 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 Supervisory Control and Data Acquisition System (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 meteorological evaluation tower (MET) data.

### 2.1.8 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.

### 2.1.9 Stormwater Basins

Stormwater will be managed through installation of stormwater basins (see Figure 2). 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.

### 2.1.10 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 2).

## 2.2 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 2), 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.

## 2.3 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) outlined in the Benton County Development Code, Section 9.20, Solar Energy Systems (Benton County 2020).

# 2.4 Project Construction

Benton Solar will complete several activities to carry the Project through to commercial operation. Table 2.4-1 provides a preliminary list of activities necessary to develop the Project and the estimated timeframe for each, which is subject to change.

**Table 2.4-1. 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 |
| 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.

## *2.4.1 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 (1.1%) 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 2).

## *2.4.2 Construction*

Construction begins after acquiring all necessary permits, execution of the Generator Interconnection Agreement, 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.

### 2.4.2.1 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. During grading activities, topsoil will be stripped, stockpiled, and labeled, as practicable, to avoid mishandling or mixing with subsoil horizons. If needed, excavated subsoil will be windrowed adjacent to excavation in areas where topsoil has been salvaged. 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 Project VMP.

#### 2.4.2.2 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.

#### 2.4.2.3 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.

#### 2.4.2.4 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.

#### 2.4.2.5 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 2.1.2.

#### 2.4.2.6 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.

### *2.4.3 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.

### *2.4.4 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.

### 2.4.5 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.

### 2.4.6 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. 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 (see Project VMP).

# 3 SOIL ASSESSMENT

Benton Solar completed a soil assessment to identify potential limitations and construction suitability issues and to identify potential adverse impacts to agricultural practices that may result from the Project. A summary of that assessment is provided below.

## 3.1 Soils

The Soil Survey Geographic database (SSURGO) is a digitized soil survey that provides GIS data relating soil map unit (SMU) polygons to component soil characteristics and interpretations. Benton Solar mapped the SMU polygons in the Site. A soil map is provided in Appendix A.

## 3.2 Limitations and Suitability Assessment

### 3.2.1 Select Physical Characteristics

Soil limitations and suitability vary by SMU. A soil's physical characteristics can impact Project construction, reclamation, and restoration activities. These physical characteristics include the following:

- **Texture:** Soil texture refers to the proportion and composition of sand-, silt-, and clay-sized particles that make up the mineral fraction of the soil. Soil texture influences water-holding capacity, infiltration rate, compaction/rutting, and how workable and fertile the soil is—all of which significantly impact revegetation capabilities. Predominant soil textures in the Site consist of coarse-loamy (358.2 acres; 37.6%) and sandy or sandy-skeletal (403.6 acres; 42.4%) textures. Loamy (150.4 acres; 15.8%) and fine (4.0 acres; 0.4%) textures are also present. SSURGO does not provide textures for approximately 35.2 acres (3.7%) that consist of soil complexes and water. These complexes are composed of sand, fine sandy loam, loamy sand, and organic soils and a

combination of organic matter, silt, and sand (as water-deposited young soils). The majority of soils in the Preliminary Development Area are sandy (approximately 282.9 acres; 44.8%) and coarse-loamy (261.5 acres; 41.4%).

- **Slope:** Slope represents the elevation between two different points and directly affects erosivity, soil strength (compaction/rutting), machine use, constructability, plantings, and revegetation. Most soils in the Site (757.3 acres; 79.6%) and the Preliminary Development Area (527.7 acres; 83.5%) are nearly level soils with representative slopes falling within the 0.0 to 8.0 percent slope range.
- **Drainage and moisture:** Soil drainage refers to the rate and degree at which water is removed by runoff, infiltration, and evapotranspiration. Soil moisture denotes the total water content in an unsaturated soil. Soil drainage and moisture affects machine use, constructability, compaction rates, erosion potential, and revegetation success. The majority (approximately 591.8 acres; 62.2%) of the soils are Somewhat Excessively (SE) drained (260.7 acres; 27.4%), Excessively Drained (ED) (293.9 acres; 30.9%), Moderately Well Drained (MWD) (32.5 acres; 3.4%), and Well Drained (WD) (4.7 acres; 0.5%). The remainder (approximately 359.5 acres; 37.8%) of the soils within the Site are in the Poorly (P), Very Poorly (VP), and Somewhat Poorly (SP) drained classes (265.2 acres [27.9%], 39.2 acres [4.1%], and 55.2 acres [5.8%], respectively). Most of the soils in the Preliminary Development Area are in the ED and SE drainage classes (189.0 and 198.3 acres, respectively; cumulatively 61.3%). Additionally, a substantial component of the soils in the Preliminary Development Area are P, SP, and VP drainage classes (203.8, 23.2, and 4.4 acres, respectively; cumulatively 36.6%). The remaining minority of mapped soils are in the WD and MWD drainage classes and comprise 13.2 acres (2.1%) of the Preliminary Development Area. Soils in the SP and P drainage classes are highly productive when drained and are frequently converted to agriculture by the installation of subsurface drain tiles. Aerial photograph inspection suggests that portions of the soils in the SP and P drainage classes in the Site and the Preliminary Development Area have been drained through ditching. It is also possible that subterranean drainage tiles have been installed for agricultural uses. MWD and SP drained soils are typically well suited to intensive agriculture.
- **Presence of stones, rocks, and shallow bedrock:** The presence of bedrock near the soil surface and rocks and stones in the soil profile affect constructability and revegetation. Soils in the Site and the Preliminary Development Area are not shallow to bedrock or likely to have stones at the soil surface or within the soil profile, based on this desktop assessment. Most soils in the Site are derived from glacial outwash sand parent material or accumulated organic matter in low, wet areas. Neither of these parent materials or soil-forming processes results in significant presence of stones near the soil surface.

Select physical characteristic data for the Site and the Preliminary Development Area are provided in Table 3.2-1.

**Table 3.2-1. Select Soil Physical Characteristics within the Site and the Preliminary Development Area**

| Map Unit Symbol | Soil Map Unit | Site | | Preliminary Development Area | | Farmland Designation | Depth to Water Table (inches) | Water Erodibility | Wind Erodibility | Hydric Soil | Compaction Prone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Acres | Percentage of Total | Acres | Percentage of Total | | | | | | |
| D7A | Hubbard loamy sand, 0 to 2 percent slopes | 181.2 | 19.1% | 130.2 | 20.6% | Not prime farmland | >80.0 | Slight | Severe | Nonhydric | No |
| C73C | Milaca loam, 1 to 7 percent slopes, stony | 151.7 | 15.9% | 133.3 | 21.1% | 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% | 93.3 | 14.8% | Not prime farmland | >80.0 | Slight | Moderate | Nonhydric | No |
| C56A | Langola loamy fine sand, 0 to 2 percent slopes | 96.1 | 10.1% | 63.9 | 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% | 83.3 | 13.2% | Farmland of statewide importance | >80.0 | Slight | Moderate | Nonhydric | Yes |
| D7B | Hubbard loamy sand, 2 to 6 percent slopes | 72.7 | 7.6% | 53.3 | 8.4% | Not prime farmland | >80.0 | Slight | Severe | Nonhydric | No |
| C67B | Bushville complex, 1 to 6 percent slopes | 24.2 | 2.5% | 18.3 | 2.9% | 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% | 8.2 | 1.3% | Not prime farmland | >80.0 | Slight | Moderate | Nonhydric | No |
| C70B | St. Francis-Mahtomedi complex, 2 to 6 percent slopes | 21.0 | 2.2% | 2.8 | 0.4% | 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% | 0.8 | 0.1% | 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% | 6.9 | 1.1% | 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% | 13.5 | 2.1% | Farmland of statewide importance | >80.0 | Slight | Moderate | Nonhydric | Yes |
| D7E | Hubbard loamy sand, 18 to 35 percent slopes | 10.7 | 1.1% | 2.0 | 0.3% | Not prime farmland | >80.0 in | Slight | Severe | Nonhydric | No |
| 1011A | Fordum-Winterfield complex, 0 to 2 percent slopes, frequently flooded | 10.7 | 1.1% | 1.8 | 0.3% | 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% | 0.7 | 0.1% | Not prime farmland | >80.0 | Slight | Severe | Nonhydric | No |
| C65A | Parent loam, 0 to 2 percent slopes, stony | 6.2 | 0.7% | 4.7 | 0.7% | Prime farmland if drained | 0.0 | Moderate | Slight | Predominantly hydric | Yes |
| 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% | 1.8 | 0.3% | Not prime farmland | 0.0 | Not rated | Slight | Hydric | No |
| C73A | Mora loam, 1 to 3 percent slopes, stony | 4.8 | 0.5% | 4.1 | 0.6% | 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% | 0.4 | 0.1% | Not prime farmland | >80.0 | Slight | Severe | Nonhydric | No |
| D61A | Glendorado loamy sand, 0 to 2 percent slopes | 4.3 | 0.4% | 1.3 | 0.2% | Not prime farmland | 12.0 | Slight | Severe | Predominantly nonhydric | No |
| C58A | Ogilvie loam, 0 to 2 percent slopes | 4.2 | 0.4% | 4.2 | 0.7% | 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% | 2.5 | 0.4% | 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% | 0.3 | <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% | 0.2 | <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 | Moderate | Slight | Predominantly nonhydric | Yes |
| C126B | Balmlake-Rosy complex, 1 to 6 percent slopes | 0.2 | <0.1% | 0.1 | <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%** | **631.9** | **100.0%** | **–** | – | **–** | **–** | **–** | **–** |

Source: Soil Survey Staff (2023a).

* Totals may vary slightly due to rounding.

### *3.2.2 Select Classification Data*

Interpretative limitations and hazards for construction and reclamation also are assessed based on soil classification data, which include the following:

- **Prime farmland status:** 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). The prime farmland designation is independent of current land use. The NRCS also recognizes farmland of statewide importance, which is defined as land other than prime farmland that is used for the production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, vegetables) (NRCS 1981). Within Benton County, approximately 1,704.7 acres (0.6%) are considered prime farmland, and 12,486.7 acres (4.7%) are considered prime farmland if drained. Approximately 131,180.6 acres (49.6%) are considered farmland of statewide importance.

  Minn. R. § 7850.4400, subp. 4, states that "no large electric power generating plant site may be permitted where the developed portion of the plant site . . . includes more than 0.5 acres of prime farmland per megawatt of net generating capacity." The exception to the rule is if there is no feasible and prudent alternative. In 2020, the Minnesota Department of Commerce issued guidance meant to "assist developers in defining feasible and prudent in relation to siting alternatives and encourage them to build a record early in the site selection process showing whether or not an exception to the prime farmland exclusion is warranted." The guidance includes a discussion of siting constraints, scoping alternatives, exemption or variance determination, and mitigations and offsetting benefits (Minnesota Department of Commerce 2020).

  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 acre (0.9%) are prime farmland if drained; and 4.6 acres (0.7%) are prime farmland (see Table 3.2-1).

- **Hydric soil status:** 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). The presence of hydric soil, along with hydrophytic vegetation and wetland hydrology, must be met in order for an area to be considered a wetland, and some wetlands are regulated under state and federal statutes (Minnesota Department of Natural Resources 2019; Soil Survey Staff 2023b).

  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 (49.9 acres; 5.3%) are classified as hydric or predominantly hydric. No soils in the Site are classified as partially hydric.

  Approximately 622.6 acres (98.4%) of the soils in the Preliminary Development Area are classified as nonhydric or predominantly nonhydric. The remainder of the soils in the Preliminary Development Area (9.3 acres; 1.6%) are classified as hydric or predominantly hydric. No soils in the Preliminary Development Area are classified as partially hydric (see Table 3.2-1).

- **Susceptibility to water erosion:** The U.S. Department of Agriculture defines highly erodible land as any land that can erode at excessive rates (U.S. Department of Agriculture 2017). Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. 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 the percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity ($K_{sat}$).

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 approximately 618.5 acres (65.1%) having a slight water erosion potential; 169.0 acres (17.7%) having moderate erosion potential; and 158.1 acres (16.5%) having severe erosion potential (see Table 3.2-1). SSURGO does not provide factor K for the remaining 5.8 acres (0.6%) of the Site. The potential for water erosion within the Preliminary Development Area is slight to severe, with approximately 394.6 acres (62.3%) having slight water erosion potential and approximately 133.3 acres (21.1%) having a severe water erosion potential. Moderate water erosion potential exists within approximately 102.2 acres (16.1%) of the Preliminary Development Area (see Table 3.2-1). SSURGO does not provide factor K for the remaining 1.8 acres (0.3%) of the Preliminary Development Area.

- **Susceptibility to Wind Erosion:** To assess the potential of soil erosion by wind, the wind erodibility group was obtained for each SMU (Soil Survey Staff 2023a). Wind erodibility groups (WEGs) consist of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. Soils are grouped according to their percentage 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; and 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 have severe wind erosion potential; approximately 296.2 acres (31.1%) have moderate wind erosion potential; and approximately 182.9 acres (19.1%) have a slight wind erosion potential (see Table 3.2-1). SSURGO does not provide WEG data for approximately < 0.1 acre (< 0.1%) of the Site. The potential for wind erosion within the Preliminary Development Area is slight to severe. Approximately 278.0 acres (43.9%) within the Preliminary Development Area have severe wind erosion potential; approximately 205.8 acres (32.5%) have moderate wind erosion potential; and approximately 148.1 acres (23.4%) have slight wind erosion potential (see Table 3.2-1).

- **Susceptibility to compaction:** Compaction and rutting are related to the soil moisture content, depth of soil, weight of equipment/machinery, number of passes completed by machinery, and soil texture. Conditions are worse when medium- and fine-textured soils are subject to heavy equipment traffic during wet conditions. Soils prone to compaction and rutting are subject to dramatic and adverse changes to soil porosity and structure. SMUs having fine texture in the SP, P, or VP drainage classes were classified as being compaction prone.

  Based on SSURGO and compaction potential of the SMU, 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 (see Table 3.2-1). Approximately < 0.1 acre (< 0.1%) of Site soils are not rated for compaction. Most of the soils in the Preliminary Development Area (385.6 acres; 61.0%) are not susceptible to compaction. Approximately 246.3 acres (38.8%) in the Preliminary Development Area are susceptible to compaction based on drainage class and texture (see Table 3.2-1).

### *3.2.3 Summary of Primary Soil Limitations*

The primary limitations for soils during Project construction, O&M, and decommissioning are presence of prime farmland; compaction and rutting that may occur, particularly when soils are trafficked when wet;

and the need and ability to reserve and store large volumes of topsoil. Each of these limitations is further described below. BMPs intended to avoid and minimize impacts to prime farmland, compaction and rutting, and impacts to topsoil are described in Section 4.

#### 3.2.3.1 PRIME FARMLAND

Benton Solar anticipates implementing the BMPs detailed in Section 4 during all Project phases to minimize impacts to prime farmland. These BMPs may include soil segregation and decompaction, measures to implement during wet weather conditions, and erosion and sediment controls. Additionally, following Project construction, soils are expected to be stabilized as the Site is revegetated with land cover–specific seed mixes developed in coordination with the Bee & Butterfly Habitat Fund (see the Project VMP). These measures are intended to avoid and minimize impacts to soil and Site productivity such that preconstruction agricultural productivity may be returned to the Site following Project decommissioning. Due to the implementation of BMPs, Benton Solar anticipates that the only impact to prime farmland is that the lands within the Preliminary Development Area will not be farmed for the life of the Project (25–30 years).

#### 3.2.3.2 COMPACTION AND RUTTING

Benton Solar will design and manage construction (e.g., access routes, number of passes on a given soil) to minimize potential impacts of compaction and rutting through repeated exposure. Additionally, Benton Solar will implement wet weather procedures if rutting is observed. Benton Solar does not anticipate that deep compaction will be a major concern because it will limit the number of construction equipment passes over a given soil and because much of the construction equipment is anticipated to consist of smaller, low-ground-pressure tracked vehicles (e.g., scrapers, motor graders, pickup trucks).

#### 3.2.3.3 TOPSOIL STORAGE

Benton Solar will conserve topsoil to the extent practical by preselecting areas to receive excess topsoil from nearby areas, grading and preparing seedbeds as appropriate, and revegetating to maintain conditions suitable for plant growth. This is described further in Section 5.2.

# 4 BEST MANAGEMENT PRACTICES DURING CONSTRUCTION AND OPERATION

Benton Solar and its contractors are committed to implementing BMPs intended to avoid, minimize, and mitigate potential impacts to agricultural lands. Under certain weather or Site conditions, Benton Solar or its contractors may identify measures that meet the intent of, and are more efficient and safer than, measures listed in this agricultural impact mitigation plan. In such cases, Benton Solar will coordinate with the environmental monitor, the Minnesota Department of Agriculture (MDA), and/or other applicable agencies to discuss potential new approaches to the specific conditions encountered, and alternate measures may be preferred. Additionally, there may be limited instances in which landowner stipulations may require modification of BMPs described below. Benton Solar will remain flexible to these stipulations and will work with landowners to arrive at mutually agreeable measures that achieve the goals of the original BMPs described herein.

## 4.1 Environmental Monitor

Benton Solar will utilize a qualified third-party environmental monitor to monitor earthmoving and trenching activities, identify any construction-related issues impacting on-site and/or off-site areas, and

recommend corrective actions, if any, to prevent/mitigate unanticipated on-site or off-site impacts. The qualified third-party environmental monitor will be subcontracted by Benton Solar or may be provided by an interested agency such as the Minnesota Department of Commerce, Energy Environmental Review and Analysis.

The environmental monitor's duties will be outlined in an environmental monitoring plan and may include the following:

- Perform weekly inspections (or more frequently as necessary) during the major earthmoving and trenching phase of Project construction;
- Observe construction crews and activities to ensure conformance with BMPs described in this agricultural impact mitigation plan (e.g., topsoil is segregated and managed appropriately);
- Monitor the Site for potential soil compaction (except within access roads) and make specific recommendations for decompaction and/or mitigation;
- Monitor for construction-related on-site and off-site impacts and make recommendations for corrective actions to Benton Solar's construction manager;
- Assist in determining if weather events have created "wet weather" conditions and provide recommendations to the construction manager on the ability to proceed with construction; and
- Submit a biweekly summary report of BMP implementation to Benton Solar and MDA concurrently during Project construction.

The environmental monitor will be responsible for communicating any environmental concerns and potential issues to Benton Solar's construction manager and MDA in a timely manner. The construction manager will use discretion to either implement corrective actions or to stop work pending additional coordination.

## 4.2 Soil Segregation and Decompaction

Monitoring soil segregation and decompaction measures will be one of the ongoing priority activities conducted during construction to minimize handling and prevent impacts to the topsoil. During grading activities, topsoil will be stripped, stockpiled, and labeled, as practicable, to avoid mishandling or mixing with subsoil horizons. If needed, excavated subsoil will be windrowed adjacent to excavation in areas where topsoil has been salvaged.

Topsoil thickness will be field tested by a Minnesota Licensed Professional Soil Scientist prior to earthwork activities within the Preliminary Development Area. Benton Solar will work with the soil scientist to label and identify the appropriate salvageable topsoil depth in that area. Benton Solar will provide this information and a recommendation on segregation methods/techniques to the environmental monitor for review and input. As an interim recommendation, Benton Solar suggests a salvageable topsoil depth of up to 12.0 inches in thickness. Topsoil greater than 12.0 inches from the soil surface would be treated similarly to the underlying subsoil, unless indicated differently by the soil scientist.

For grading activities, topsoil will be salvaged and stockpiled in preselected areas to maintain soil characteristics and prevent undesirable species from establishing. Stockpiles will be seeded with a desired seed mixture if in place for more than 14 days, or a duration specified in the erosion control or SWPPPs.

For trenching activities, or those with similar operations of temporary excavations and backfilling, the subgrade material will be backfilled first and compacted, as necessary, followed by backfilling with topsoil

and grading to the approximate preconstruction contour.[3] Compaction will be avoided, to the extent possible.

Following earthwork activities where segregation of topsoils/subsoils is necessary, topsoil will be backfilled as the top layer to maintain the overall integrity and character of the pre-disturbed areas. Any excess topsoil material will be respread within the Site at pre-established locations. Topsoil stockpile volumes and locations will be documented to facilitate backfilling after decommissioning.

## 4.3 Wet Weather Conditions

Wet weather conditions may necessitate a temporary halt or modification of construction activities. The construction manager will be responsible for identifying these conditions and delaying or modifying activities if weather conditions pose a risk to worker safety or if conditions are such that heavy equipment would cause severe rutting or compaction. Deep compaction is not anticipated to be a significant concern as the equipment is anticipated to consist of smaller, low-ground-pressure tracked vehicles, and the number of passes over a given area is limited. Measures to avoid topsoil compaction during wet conditions may include, but not limited to, stripping and segregation of topsoil, use of temporary construction mats, or use of equipment with flotation tires that do not compact soil.

Following initial grading activities, many operations can be conducted in wet weather without the use of heavy equipment. However, the construction manager is responsible for ensuring that topsoil erosion, rutting, compaction, and damage to drain tiles (as present) are avoided or minimized to the extent possible. The construction manager will work with the soil scientist and the environmental monitor to ensure that techniques/practices are employed to decompact soils appropriately following wet weather conditions. Decompaction with chisel plows prior to disking and seeding will be a standard method of soil bed preparation for areas proposed to be seeded with regionally appropriate, perennial grasses, forbs, and pollinator species. Agricultural equipment capable of operating between panel lines when panels are oriented vertically would be used to decompact, prepare a seedbed, and plant the desired seed mixes.

## 4.4 Grading/Earthwork

The initial phase of Project construction will include the major cut and fill activities and will be performed by Benton Solar's contractor. During grading activities, topsoil will be stripped and stockpiled, and replaced after grading activities have been completed. Soil testing, conducted by a soil scientist prior to grading activities, will measure and verify salvageable topsoil depths. Benton Solar will provide this information and a recommendation for segregation methods to MDA for comment.

The stripped topsoil will be bladed into windrows for later use, and the subgrade materials will be removed and relocated to low spots throughout the Site. Upon completion of stripping the topsoil and subsoil in the lower areas, fill and/or subgrade material will be brought in and used as backfill and compacted, and the topsoil will be used to backfill over the top. The topsoil will be loosely compacted and/or tracked and BMPs will be implemented.

Once the topsoil has been stripped and stockpiled, grading activities may be necessary to raise or lower certain areas, but the majority of the Project's topography will be left unchanged.

[3] Benton Solar recognizes that topsoil mixing is both an aesthetic and crop-productivity issue and intends to minimize, to the extent practicable, topsoil and subsoil mixing during construction, operations, and decommissioning/reclamation. For the purpose of identifying areas where topsoil mixing is a potential issue, the environmental monitor will consider topsoil stockpiles, restored trench excavations, and post-closure restored areas with > 5.0% area of the soil surface as obvious subsoil inclusions to be out of compliance. Remediation may consist of removal of subsoil and replacement with acceptable topsoil.

## 4.5 Roads

Permanent access roads and turnouts will be developed during initial construction phases. In the context of Facilities, permanent describes Facilities that will be in place for the life of the Project (25–30 years), and temporary describes Facilities that will be in place only during construction and then removed.

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 turnaround. 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. Construction will start by stripping and segregating the topsoil/subsoil materials from the anticipated road width. The subgrade materials will be compacted to the specified requirements provided by the civil and geotechnical engineer. Once compaction of the subgrade materials is reached and verified, the road will be built to design and will be completed with or without geo-fabric netting. Four to 12.0 inches of road surfacing material (aggregate) will be installed across the surface of the road and leveled to the existing grade to facilitate drainage and minimize ponding.

Ditches will be installed once access roads have been graded and surfaced and will be built to design as identified on the final grading plan. Any remaining windrowed topsoil will be collected and respread throughout the Site.

Topsoil removed during the construction of access roads will be collected and stockpiled at defined, suitable locations near the removal location and added to existing topsoil for storage. Stockpile locations will be identified (GPS boundary and depth) and recorded on Site maps to facilitate final reclamation after decommissioning.

## 4.6 Solar Array Construction

Once grading activities are complete and the topsoil has been replaced, the racking system supports will be constructed using steel piles driven into the ground by a hydraulic ram operated by two employees. In situations where soils consist of low strength, loose, or non-cohesive sand, a helical screw or auger-type foundation post(s) may be used. Soil disturbance will be minimal and restricted to the post driving locations and the equipment tracks.

During array and racking assembly, vehicular traffic will be limited to access roads to minimize soil disturbance and soil mixing and to prevent soil compaction. However, two-track roads may be created during construction to transport personnel, parts, and equipment via flatbed trucks, pickup trucks, all-terrain vehicles, forklifts, and skid steers. Access roads will be pre-established and staked to define and confine the route.

## 4.7 Foundations

Benton Solar's contractor will also perform foundation work for the substation and inverters. The substation will have the topsoil stripped and the pier-type foundations installed. The subgrade materials will be compacted and graded, and clean, washed rock will be installed across the surface. The stripped topsoil will be collected and relocated to designated areas to be used later. The topsoil will be either windrowed or stockpiled and tracked. Stormwater control and/or wind erosion BMPs will be installed after the topsoil has been tracked. Once substation foundation construction is complete, topsoil piles will be distributed in a thin layer adjacent to the substation.

The foundation for inverters will be constructed similarly to the substation. Foundation footprints will be dug out with a rubber-tire backhoe and then concrete with rebar will be poured and left to cure. After the concrete has cured, concrete strength will be tested and then spoils around the inverter will be compacted. After the inverter is set, topsoil will be backfilled and graded around the inverter.

After decommissioning, subsoil and topsoil will be used to bring the area back to preconstruction contours.

## 4.8 Trenching

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. Trenches will be open trenched (dug) or plowed in place. The topsoil and subgrade materials will be excavated. The bottom of each trench may be lined with clean fill to surround the cables. Benton Solar anticipates that no foreign fill will be necessary. After cables have been installed in the trench, at least 7.0 inches of screened, native backfill will be set on the cables followed by unscreened native backfill trench soil.

## 4.9 Temporary Erosion and Sediment Control

Benton Solar will prevent excessive soil erosion on disturbed lands by developing and implementing a SWPPP required under the National Pollutant Discharge Elimination System administered by the Minnesota Pollution Control Agency. Prior to construction, Benton Solar will work with the contractor to outline requirements and practices established in the SWPPP.

Methods to control erosion will include, but not be limited to, silt fencing to aid in controlling stormwater runoff and interim reclamation practices to stabilize soil and control erosion. Common areas for silt fence installation will include the downside of all hills, areas adjacent to waterways, and areas near drain tile inlets. Check dams and straw wattles will be used to help control run-on and runoff, and act as water velocity inhibitors. Erosion control blankets may also be used to help stabilize the soil along steep slopes; however, given the Site topography, they may not be required.

An environmental monitor will monitor daily construction activities and identify any areas where there is a potential for erosion/sediment issues.

## 4.10 Drain Tile Identification, Avoidance, and Repair

### *4.10.1 Preconstruction Mapping and Repair*

Benton Solar will map the presence of drain tiles through the following:

- Conducting landowner coordination to identify known tile locations;
- Collecting and/or assessing existing infrared aerial photographs and LiDAR data; and
- Completing, if necessary, a Project-specific tile locate survey with a local agricultural drain tile contractor.

If necessary to determine the physical location of tiles, Benton Solar will use a small excavator to dig a shallow trench at varying intervals perpendicular to areas where research has indicated tiles to be present. Benton Solar will identify visible surface inlets and insert a tile probe to locate tiles and determine the

direction from the inlet. If necessary, tiles may be exposed to determine size, type, flow direction, and condition.

Benton Solar will repair or replace any damaged tile encountered during the tile location process to its original size and capacity. Repairs or rerouting will be performed using a small to mid-sized excavator. Laser equipment will be used to ensure proper grading of the pipe. In the event a line of significant size and length needs to be rerouted or installed, a commercial drainage plow could be used.

The drainage plow typically utilizes a GPS unit with survey-grade accuracy to ensure pipe is installed to specified slopes. The following considerations apply:

- Tiles will be repaired with materials of the same or better quality as that which was damaged.
- Tile repairs will be conducted in a manner consistent with industry-accepted methods.
- Before completing tile repairs, tiles will be examined within the work area to check for tile that might have been damaged by construction equipment. If tiles are found to be damaged, they will be repaired to ensure they operate as well after construction as before construction began.
- Benton Solar will make efforts to complete tile repairs within a reasonable time frame, weather and soil conditions considered.

### *4.10.2 Project Design Considerations*

Benton Solar will aggregate the results of drain tile mapping into GIS layers and computer-aided design files depicting tile locations. This information will be provided to the solar array design engineers. Engineers will design Facilities with consideration to tile locations to ensure facility placement does not damage tiles, to the extent possible. In some areas, tile rerouting may be necessary, and rerouting will take place immediately prior to or during construction and in coordination with the landowner.

### *4.10.3 Construction Measures*

In instances where Facilities may intersect tile drains, Benton Solar will implement measures to ensure the integrity of the drainage system remains intact during and after construction. Tile lines that are in direct conflict with Facilities (i.e., collection lines) will be rerouted if necessary, to avoid compromising the drainage system. Tile lines that do not directly conflict with Facilities but that have the potential to be damaged (e.g., by construction traffic) will be bridged or otherwise reinforced to maintain integrity.

### *4.10.4 Operation Measures*

Following completion of construction, Benton Solar will inspect the Site after significant snowmelt or rainfall events to ensure the tile systems are functioning adequately. The tile contractor will identify areas of standing water and/or localized wet areas, which could indicate tile lines are not operating properly. Tiles would be repaired following the process outlined in Section 4.10.1.

## 4.11 Debris Removal

Benton Solar or its contractor(s) will remove construction-related debris and unused material. Any below-grade, unusable materials will be removed and disposed of at a designated off-site location. Benton Solar or its contractor(s) will use locally sourced waste containers and removal services to regularly inspect and schedule pick-ups for full containers that will be replaced by empty ones. To the extent practicable, recyclable materials (e.g., cardboard) will be sorted and recycled at a local facility.

Debris/trash collection points and containers will be located in the laydown yards and at strategically designated locations adjacent to work areas. Benton Solar or its contractor(s) will conduct daily inspections to collect any loose debris around the Site, ensuring all trash and debris are disposed of properly. Contaminated materials are not expected to be discovered. However, if such materials are encountered during construction, specialized handling and disposal instructions will be utilized to dispose of the material in accordance with applicable laws, ordinances, regulations, and standards.

# 5 DECOMMISSIONING

Benton Solar will implement all decommissioning activities in accordance with the Benton County Development Code (Benton County 2020). Additionally, Benton Solar will comply with Project permits and plans, including any National Pollutant Discharge Elimination System/State Disposal System permits; a spill containment and countermeasure plan; and a SWPPP, as applicable.

## 5.1 Removal and Disposal of Project Components

Decommissioning includes removal of Facilities as described below. Disposal of structure and/or foundations will meet the provisions of the County Solid Waste Ordinance.

- **Solar panel array:** 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 and/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 water 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.

## 5.2 Restoration/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 the Joint Site Permit 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 groundwater movements.
- Stabilize soils and return them 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 disturbance 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 topsoil and stockpile in a designated area separate from other excavated material, in accordance with this plan. 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 practical. 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.

### *5.2.1 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 earthmoving 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.

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# APPENDIX A

## Project Soils Map

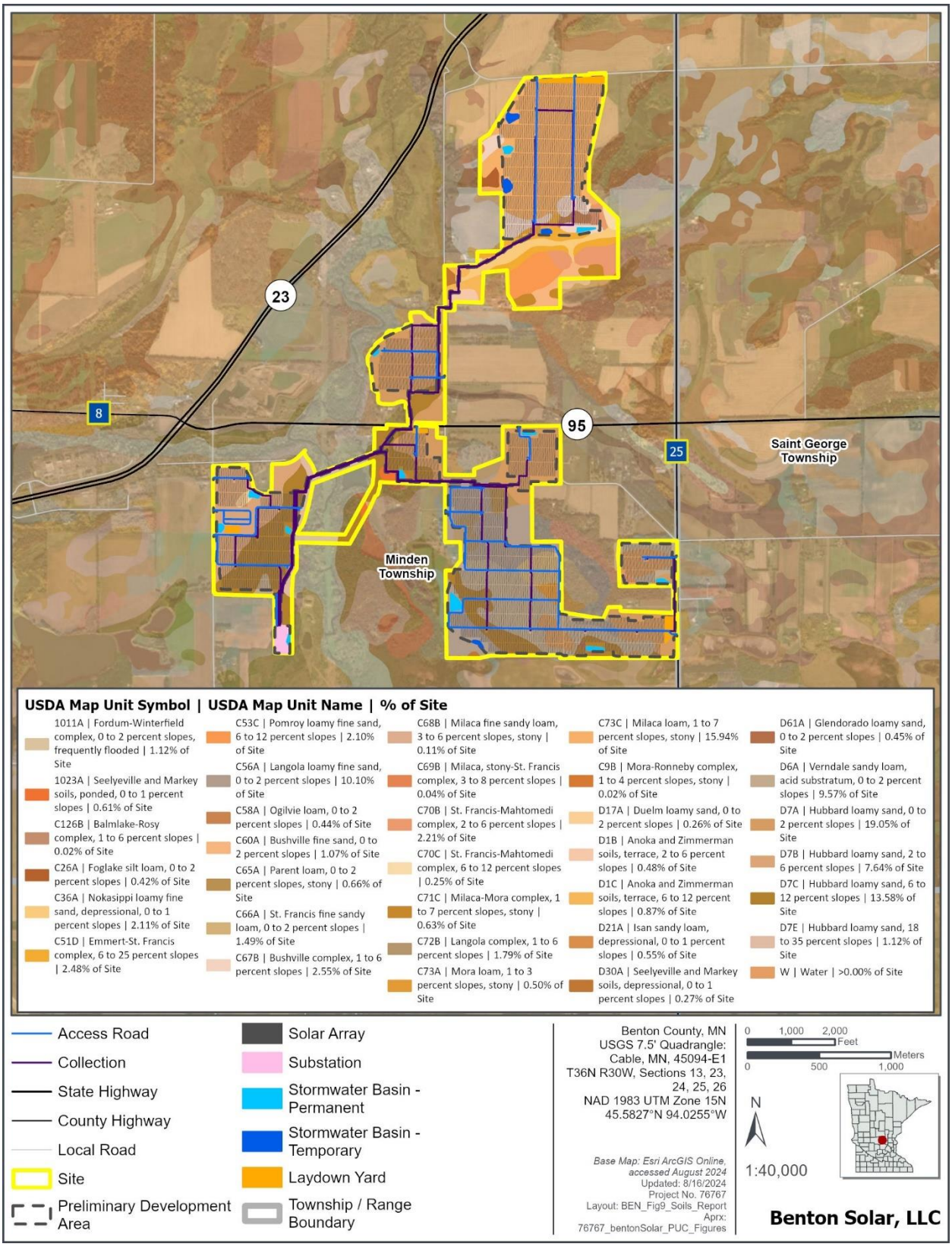


**Figure A-1. Soils in the Benton Solar Project Site and Preliminary Development Area.**

# APPENDIX D

# Vegetation Management Plan

# Vegetation Management Plan for the Benton Solar Project in Benton County, Minnesota

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

**AUGUST 2024**

PREPARED FOR

**Benton Solar, LLC**

PREPARED BY

**SWCA Environmental Consultants**

# VEGETATION MANAGEMENT PLAN FOR THE BENTON SOLAR PROJECT IN BENTON COUNTY, MINNESOTA

Prepared for

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

August 2024

# CONTENTS

# Appendix



# Figures



# Tables

# 1 EXECUTIVE SUMMARY

Benton Solar, LLC (Benton Solar), a wholly owned, indirect subsidiary of NextEra Energy Resources, LLC, 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 Site is the 951.4[1] acres for which Benton Solar has full land control. 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) (Figure 2). Facilities include all temporary and permanent features associated with the Project. The transmission line is a 0.5-mile-long, 115-kilovolt line that will deliver energy from the Project to the electric grid. The transmission line Route encompasses the Proposed Alignment and transmission line right-of-way (ROW). The Route varies in width, ranging from 454.7 to 1,308.3 feet. The transmission line ROW describes the area 50.0 feet either side of the alignment and is the area in which all construction activities will occur. Benton Solar anticipates a commercial operations date by the fourth quarter of 2027.

Benton Solar has developed this vegetation management plan (VMP) to guide Site preparation, vegetation establishment and management, undesirable species management, and erosion control. Benton Solar's 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 (Section 2.2). Vegetation management is designed to continue for 3 years then transition into long-term maintenance (Minnesota Department of Natural Resources [MDNR] 2020).

Benton Solar, its contractors, and the vegetation manager are responsible for implementation of this VMP and will be knowledgeable of the goals, objectives, and practices established herein. The term "vegetation manager" referenced herein refers to an approved and qualified ecological restoration expert that has demonstrated familiarity with these plans and sufficient botanical experience identifying native plants, native plant communities, invasive species, and non-native species typical of Minnesota. The vegetation manager may be a Benton Solar employee or other qualified agent. Benton Solar and its contractors will select equipment for use within the solar arrays that are of a size and dimension that allow safely fitting and operating within the Project solar array row widths. Further, Benton Solar intends to coordinate Site preparation and vegetation installation practices established herein with the Bee & Butterfly Habitat Fund (BBHF) to ensure consistency with Solar Synergy standards. The VMP is intended to be a working document and will be revised if appropriate as new information regarding vegetation management, Preliminary Development Area characteristics, and management practices becomes available.

[1] All measurements presented in this plan are approximate and have been rounded to the nearest tenth.

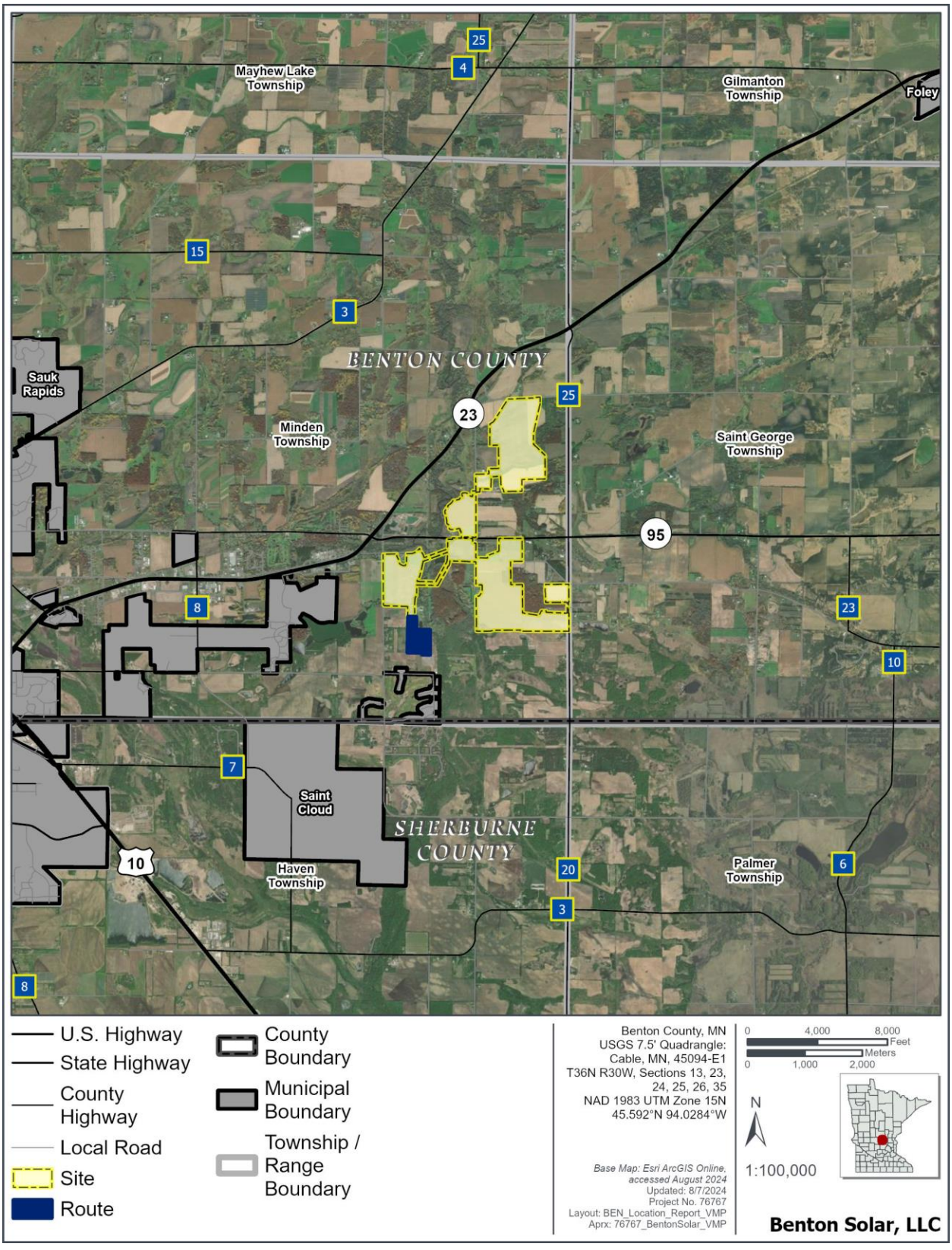


**Figure 1. Project location.**

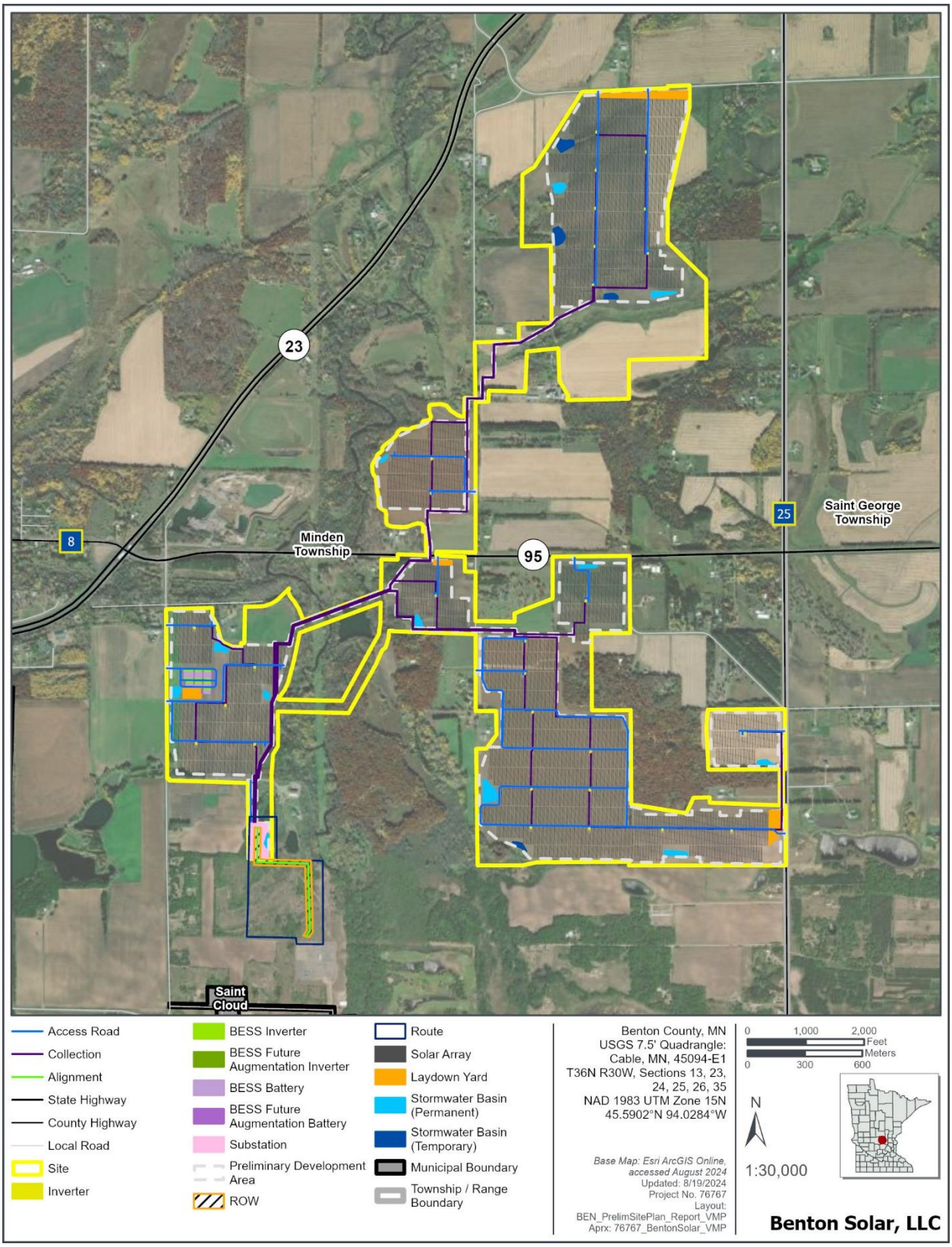


**Figure 2. Preliminary site plan.**

# 2 PLAN OVERVIEW

## 2.1 Guidance Documents

The methods and seed mixes described in this VMP follow State of Minnesota best practices and guidance for establishment of native vegetation (Minnesota Board of Water and Soil Resources 2019, 2022a, 2022b; Minnesota Department of Commerce 2021; MDNR 2020, 2023a).

Benton Solar has also partnered with the BBHF through the Solar Synergy program to inform and support Benton Solar's vegetation management goals and objectives. The Solar Synergy program, through partnership with the Monarch Joint Venture (MJV), works directly with solar developers to strategically design and monitor high-quality pollinator habitats within utility-scale renewable energy projects. The Solar Synergy program consists of uniquely designed outcomes that deliver multiple key benefits to projects, including development of high-value pollinator seed mixtures and extensive monitoring of pollinator health.

## 2.2 Goals and Objectives

Benton Solar's primary goals related to vegetation management, and objectives necessary to meet those goals, are described below.

- **Goal No. 1**. Establish regionally appropriate vegetation.
    - **Objective 1a**. Select species for inclusion in seed mixes based on the Site location and conditions, including hydrology and soil type.
- **Goal No. 2**. Establish regionally appropriate vegetation that, to the extent practicable, will not impede Project operation.
    - **Objective 2a**. Design seed mixes using species with a maximum height of approximately 20 inches to minimize concerns for shading of and interference with solar panels, which can result in reduced performance and safety hazards, while providing ancillary ecological benefits.
    - **Objective 2b**. Implement industry standard practices, including periodic mowing, to manage vegetation height.
- **Goal No. 3**. Establish regionally appropriate vegetation that, to the extent practicable, will reduce long-term maintenance and invasive species management efforts.
    - **Objective 3a**. During establishment, in Years 1 through 3, focus management on managing undesirable vegetation using industry standard practices such as mowing, herbicide application, and hand removal.
    - **Objective 3b**. During long-term management, conduct annual monitoring to determine whether, and what, maintenance is needed. If establishment is considered incomplete, implement measures outlined in Section 5.3.3.
- **Goal No. 4**. Establish regionally appropriate vegetation that, to the extent practicable, will stabilize soils, control surface runoff, and prevent soil erosion.
    - **Objective 4a**. Maximize establishment of vegetation during the preconstruction and construction phases to stabilize soils and to meet the requirements of the National Pollutant Discharge Elimination System permit and the Project's Stormwater Pollution Prevention Plan (SWPPP).

- **Goal No. 5**. Establish regionally appropriate vegetation that, to the extent practicable, will increase ecological diversity and function.
    - **Objective 5a**. Design seed mixes to use species that provide pollinator value greater than that provided by existing vegetation and promote the establishment of a diverse vegetation community that provides ecosystem service throughout various growing seasons (i.e., spring through autumn seasons).

# 3 SITE DESCRIPTION

## 3.1 Project Location and Size

The proposed Project is a 100-MW AC nameplate capacity Solar Facility and a 100-MW BESS, and associated facilities to be located in Minden Township, Benton County, Minnesota. The Project would produce up to 201,480 megawatt hours of solar energy annually. The Project is located in Township 36 North, Range 30 West, Sections 13 and 23–26. Benton Solar plans to develop a 115-kV transmission line of 0.5 mile in length (and with a 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 Minnesota Statutes Chapter 216E and Minnesota Administrative Rules Chapter 7850 (Commission Docket IP7115/TL-23-425), and the transmission line is addressed in the Route Permit Application. The transmission Route varies in width ranging from 454.7 feet to 1,308.3 feet. The transmission line ROW describes the area 50.0 feet either side of the transmission line alignment (see Figure 2).

## 3.2 Land Cover

The Project is located in a primarily agricultural and rural community setting (Figure 3). Primary land cover within the transmission line ROW is agriculture (hay/pasture [3.3 acres, 62.3%] and cultivated crops [1.2 acres, 22.6%]). Herbaceous cover (0.5 acre, 9.4%) and barren land (0.2 acre, 5.7%) comprise the remainder of the transmission line ROW. The primary land use within the Site is cultivated crops (88.1%), followed by hay/pasture (4.5%) and deciduous forest (3.6%). Each of the remaining land cover types present in the Site accounts for 1.4% or less of the total area. The primary land use within the Preliminary Development Area is cultivated crops (97.3%). Table 3.2-1 presents land cover data for the Site and Preliminary Development Area (U.S. Geological Survey 2021).

**Table 3.2-1. 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% |

| 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 |
|---|---|---|---|---|
| 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: U.S. Geological Survey (2021).

*Totals may be off slightly due to rounding.

## 3.3 Existing Vegetation

The Site lies within the Mille Lacs Uplands Subsection Ecological Classification System (ECS) 212Kb and the Anoka Sand Plain Subsection ECS 222Mc (MDNR 2023b). ECS 212Kb is characterized by gently rolling till plains and drumlin fields of the Superior Lobe ground moraines and end moraine in east-central Minnesota. Pre-settlement vegetation consisted of a mosaic of forest types. 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. Pre-settlement vegetation predominantly consisted of oak barrens and openings on droughty uplands and sandplain brushlands (MDNR 2023b).

Benton Solar completed aquatic resources surveys for the Project in 2022, 2023, and 2024. The majority of the Preliminary Development Area is typical of agricultural areas in central Minnesota. Upland areas were dominated by common hackberry (*Celtis occidentalis*), white oak (*Quercus alba*), bur oak (*Quercus macrocarpa*), sugar maple (*Acer saccharinum*), reed canarygrass (*Phalaris arundinacea*), ground ivy (*Glechoma hederacea*), goldenrod (*Solidago altissima*), green bristlegrass (*Setaria viridis*), yellow foxtail (*Setaria pumila*), and smooth brome (*Bromus inermis*). American elm (*Ulmus americana*), Canada thistle (*Cirsium arvense*), and stinging nettle (*Urtica dioica*) are also present in upland. 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.

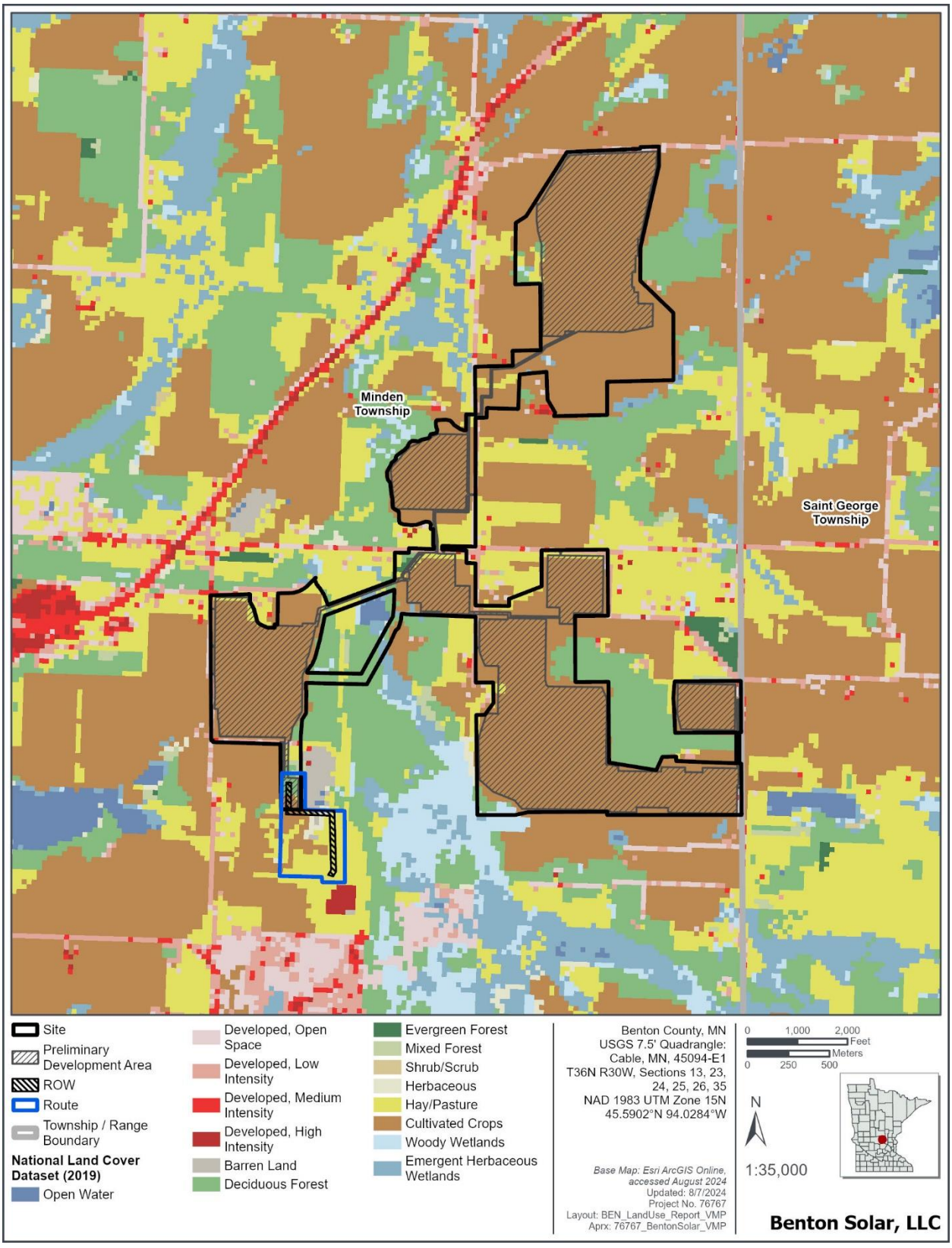


**Figure 3. Land cover.**

## 3.4 Soils

Soil resources within the Site and transmission line ROW were evaluated using the gridded Soil Survey Geographic database (SSURGO) (Soil Survey Staff 2023a). SSURGO, developed by the Natural Resources Conservation Service 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 4). 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 2023b). Soils fall into a mesic temperature regime with average soil temperatures between 46.4 degrees Fahrenheit (°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 A-1 in Appendix A).

Three SMUs were identified within the transmission line ROW (see Figure 4). The SMUs are Hubbard loamy sand, 2 to 6 percent slopes (21.2.0% of the transmission line ROW) and 6 to 12 percent slopes (26.9% of the transmission line ROW). SMU Stonelake-Sanburn complex, 15 to 40 percent slopes makes up the remaining 51.9% of the transmission line ROW.

## 3.5 Topography

The Project consists of a near level to gently rolling topography, with elevation ranging from 1,004 to 1,100 feet (Figure 5).

## 3.6 Hydrology

Benton Solar completed aquatic resources surveys for the Project in 2022, 2023, and 2024. A total of 13 wetlands totaling 23.5 acres were delineated within the Site. The total length of waterbodies within the Site is 0.2 mile (Figure 6). This includes one named river (Elk River) and three unnamed waterbodies. No wetlands or waterbodies are present in the transmission line ROW.

The National Park Service Nationwide Rivers Inventory does not identify any free-flowing stream or river sections in the Site or transmission line ROW (National Park Service 2022). 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. Outside of the floodplains, there are 68.3 acres of shoreland buffer in the Site, only 12.3 of which occur in the Preliminary Development Area (Benton County 2023a, 2023b). 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 floodplain on such river” (Benton County 2023a). No floodplains or shoreland buffer areas are located in the transmission line ROW.

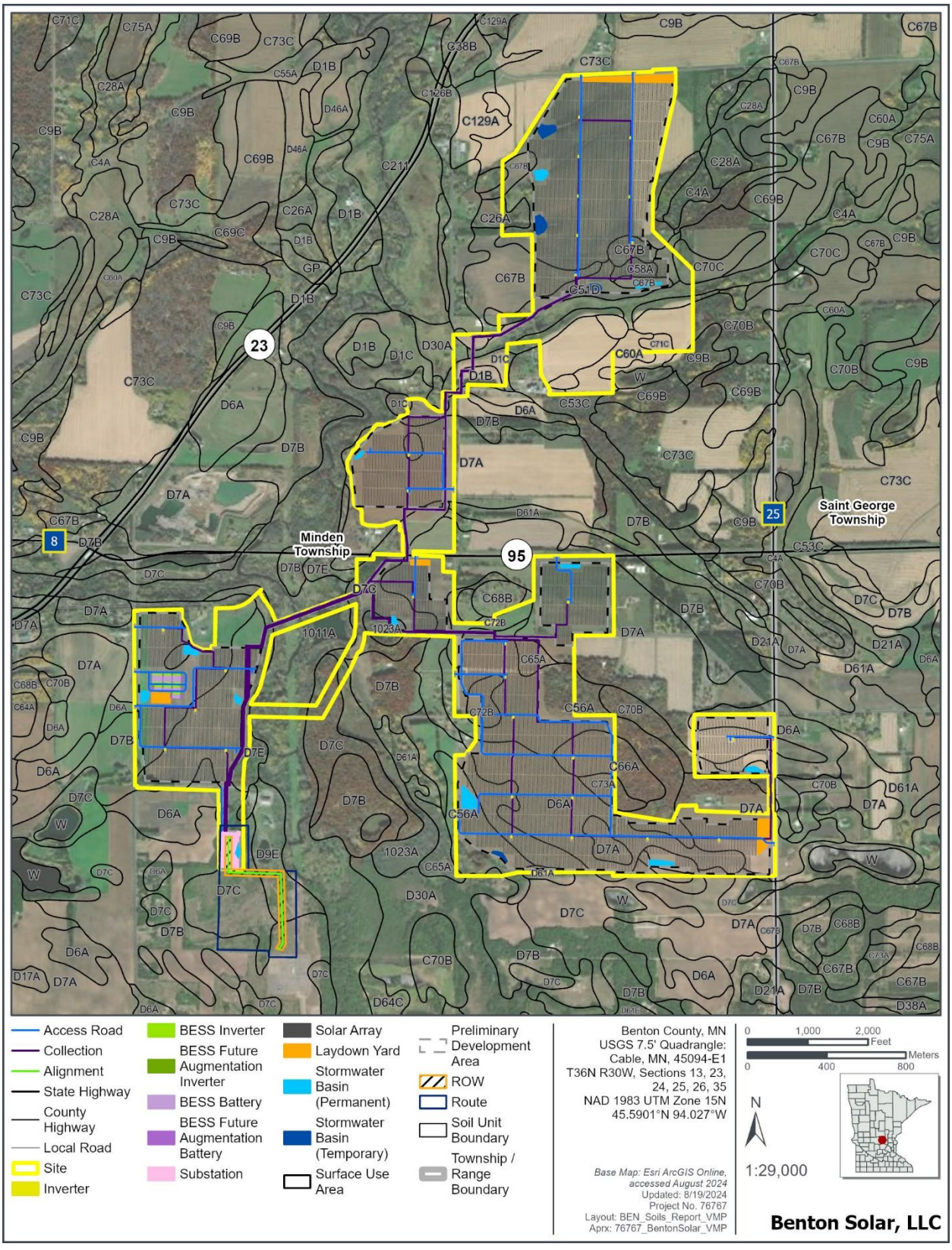


**Figure 4. Soils.**

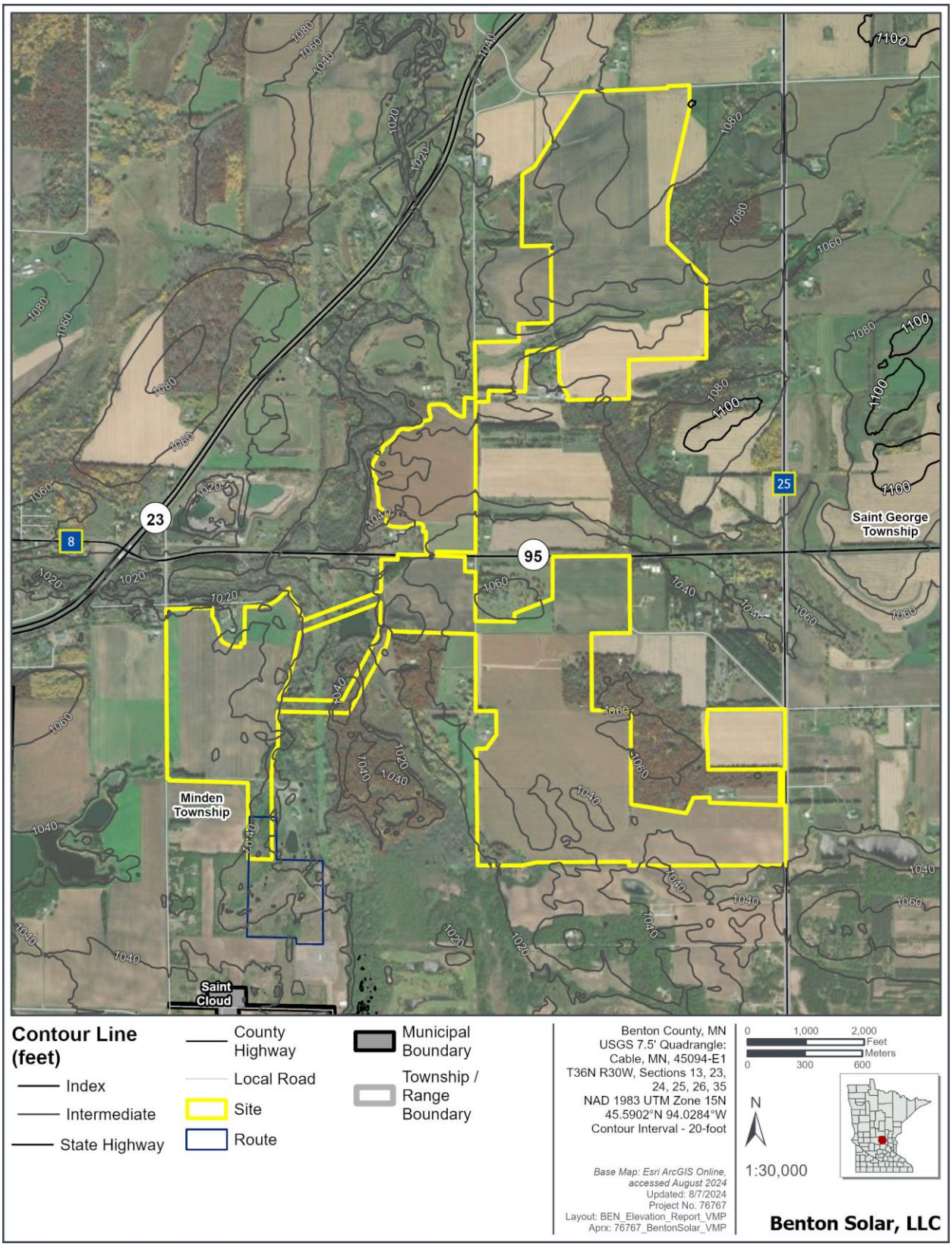


**Figure 5. Topography.**

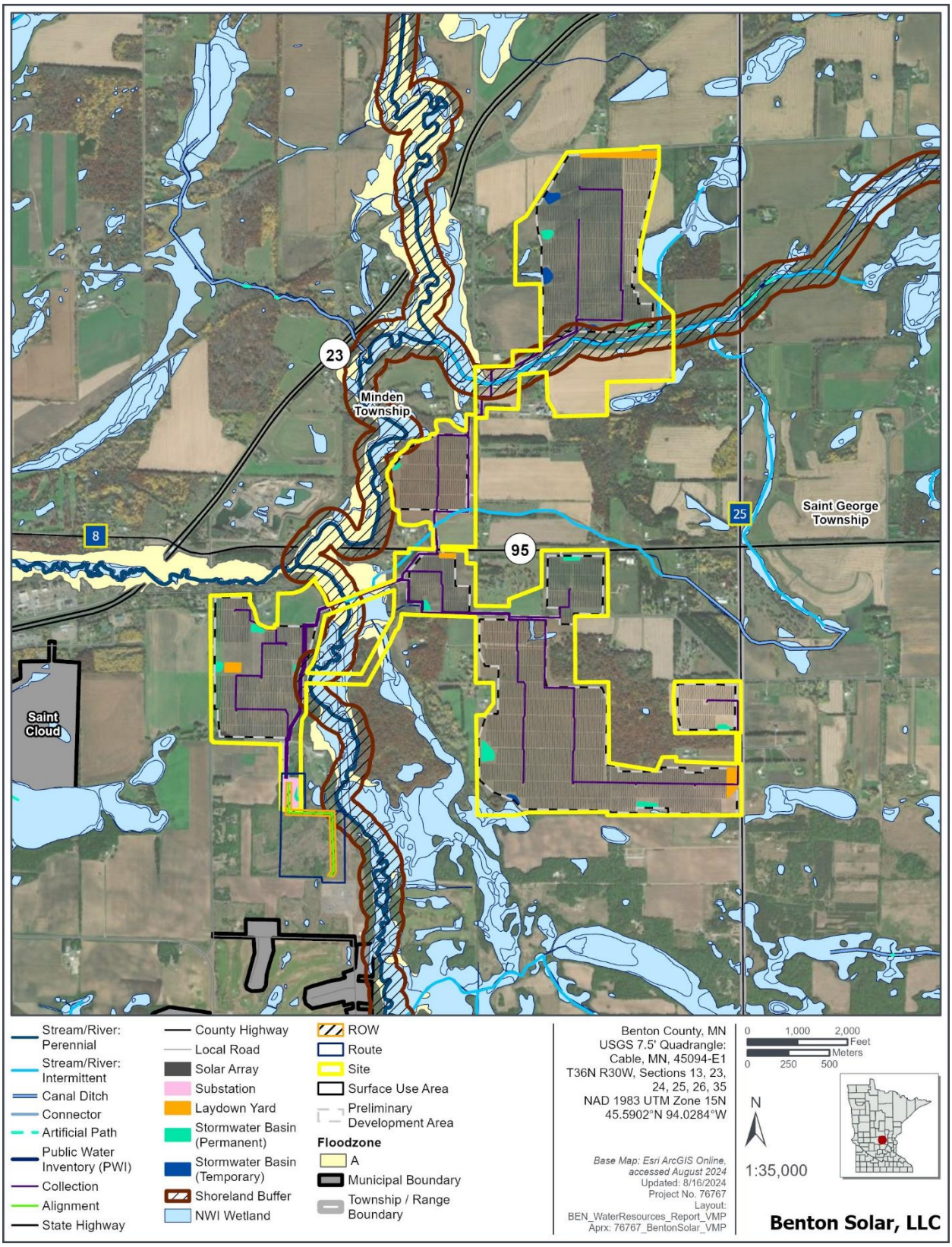


**Figure 6. Hydrology.**

# 4 VEGETATION MANAGEMENT AREAS AND ACTIONS

Vegetation management objectives have been developed specific to vegetation management areas, which include the array management area (510.8 acres), buffer management area (55.1 acres), and transmission line ROW management area (5.2 acres) (Figure 7). The majority (98.1%) of the array management and buffer management areas is currently agricultural (i.e., cultivated cropland and hay/pasture); Benton Solar will convert 571.1 acres, almost 90.0% of the Preliminary Development Area, to a pollinator-friendly landscape composed of regionally appropriate vegetation species that are designed to promote biodiversity through implementation of this plan. The size of each vegetation management area reported herein is approximate based on preliminary design and is subject to change during micrositing activities.

The following sections describe objectives for the preconstruction, construction, and O&M phases for the array management area and the buffer management area. The array management area and buffer management area share the same overall goals and objectives established herein and are both designed to meet the rigorous standards outlined in Section 5.2.1. The primary difference is that the buffer management area is not subject to vegetative height restrictions and thus utilizes a more diverse seed mix that includes taller species. The transmission line ROW management area is located on land owned by Great River Energy (GRE) in a corridor that is designated to host various transmission line and substation upgrades. Therefore, the restoration objective within the ROW will be to install a regionally appropriate seed mix compatible with GRE's utility expansion plans. The ROW will be managed using standard integrated vegetation management practices, including noxious weed control, in coordination with GRE and associated stakeholders. The BESS will be located on a graveled (or equivalent material) surface similar to the Project substation and is therefore not further addressed in this VMP.

Project construction stormwater permits may impose additional requirements related to type, quality, and performance of installed vegetation and will guide establishment of vegetation within stormwater basin areas. Buffer management area mix species (see Section 5.2.1) may also be utilized in stormwater basin areas if Project objectives and site conditions allow.

## 4.1 Preconstruction and Construction

Preconstruction begins when Benton Solar assumes Site control and ends when construction activities begin. Construction is the phase during which Facilities are installed and includes, but is not limited to, access road construction and installation of solar arrays.

The following vegetation management actions apply to vegetation and soil management during the Project's preconstruction phase and prior to the installation of any Facilities or land-disturbing activities.

- **Vegetation Management Action – PC1.** In portions of the management areas where grading is not anticipated as part of construction, establish the array management area mix and buffer management area mix (Section 5.2.1) during the earliest available optimal seeding window to initiate permanent vegetation establishment (see Section 5.2.2, Table 5.2-4).
- **Vegetation Management Action – PC2.** In portions of the management areas where grading is anticipated as part of construction, establish, and maintain a temporary seed mix/cover crop until grading is complete to provide soil stabilization and compliance with SWPPP conditions, where necessary. If construction activities extend beyond the life cycle of the temporary vegetation, consider reseeding areas, as necessary.

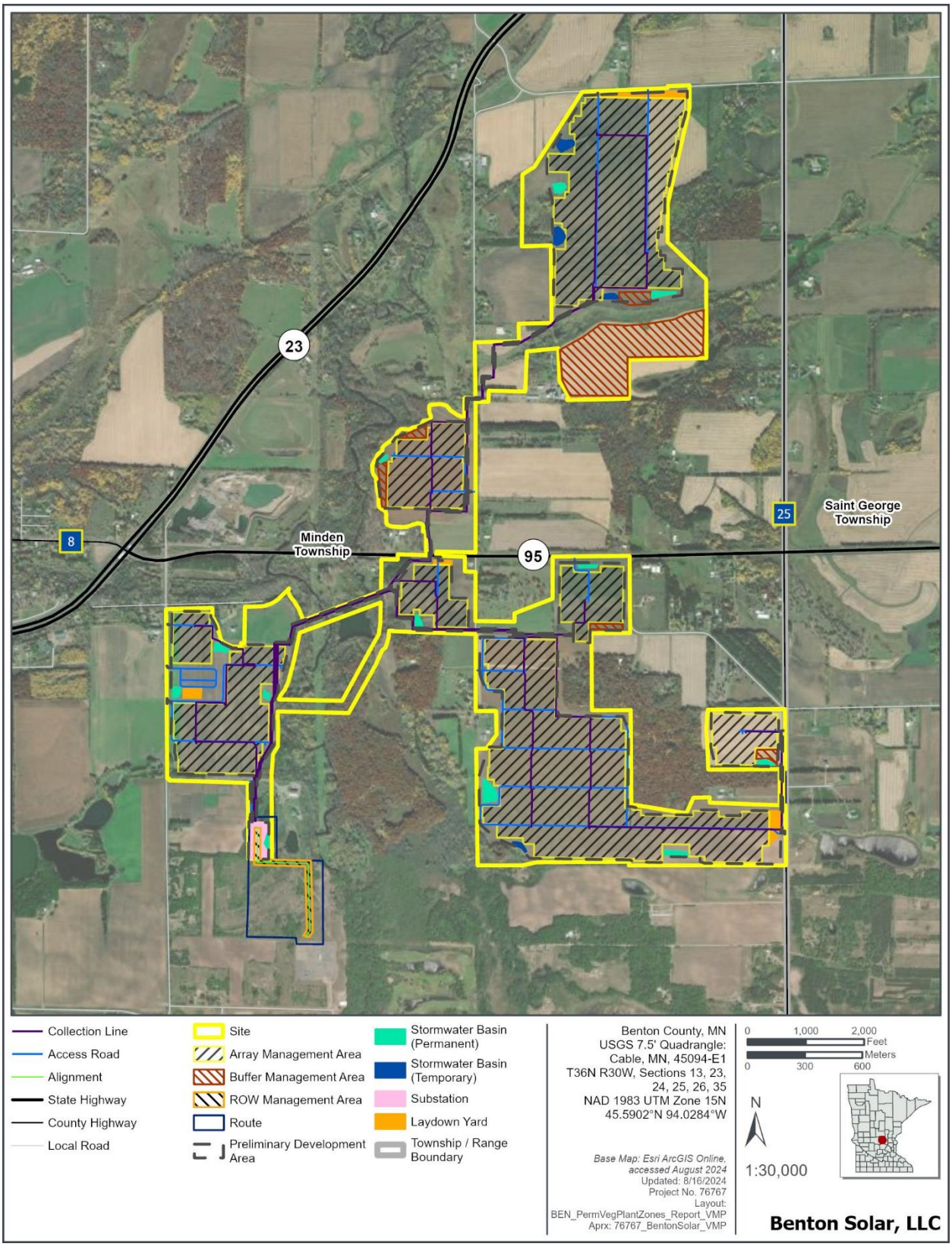


**Figure 7. Management areas.**

The following objectives apply to vegetation and soil management during the Project's construction phase.

- **Vegetation Management Action – C1.** In management areas where perennial vegetation was established during the preconstruction phase, manage vegetation in a manner that supports compliance with SWPPP conditions. Management includes mowing, herbicide applications, and reseeding areas disturbed by construction activities.
- **Vegetation Management Action – C2.** In management areas where construction requires grading or land disturbance, establish the array management area mix and buffer management area mix following completion of grading activities and prior to installation of Facilities (e.g., solar arrays, collection lines). Use management practices including mowing, spot-spraying, and reseeding to minimize establishment of state-listed noxious weed species (Minnesota Department of Agriculture [MDA] 2023a).
- **Vegetation Management Action – C3.** In areas where establishing the array management area mix and buffer management area mix immediately following construction is not possible, install a temporary seed mix to stabilize soil and control establishment of weeds and undesirable species, to remain compliant with SWPPP conditions and establish permanent vegetation during the earliest available optimal seeding window, and to increase the probability of successfully establishing vegetation. Use management practices including mowing, spot-spraying, and reseeding to minimize establishment of state-listed noxious weed species.

# 4.2 Postconstruction

## *4.2.1 Short-Term*

Benton Solar understands the importance of demonstrating progress towards meeting desired objectives. Table 4.2-1 provides vegetation cover performance criteria for short-term and long-term objectives. Performance criteria are benchmarks and are included as a reference for measures obtained during inspections and monitoring, and to demonstrate trends or progress towards meeting and maintaining the management objectives. Benton Solar will compare actual vegetation performance to benchmarks in considering the success of current management in meeting objectives, and in identifying the need for additional, or different, management actions.

**Table 4.2-1. Vegetation Cover Performance Criteria**

| Phase | Year | Percent Cover | | |
|---|---|---|---|---|
| | | Desired Species* | MDA-listed Noxious Weeds† | Undesirable Species |
| Establishment | 1 | ≥25% | ≤10% | ≤50% |
| | 2 | ≥50% | ≤5% | ≤30% |
| | 3 | ≥75% | ≤1% | ≤10% |
| Maintenance | 4+ | ≥85% | ≤1% | ≤10% |

Note: Seeds installed during the growing season and prior to mid-September, that year would be considered Year 1. If seeds are installed after the growing season ends (approximately early November), germination of the seed is likely to occur in the following spring. Due to this, the following spring would mark the beginning of Year 1.

* Desired vegetation includes native seed mix species and/or naturally recruited species from existing vegetation; desired vegetation composition will be monitored, managed, and maintained to achieve vegetation management actions established for short-term management.

† MDA-listed noxious weeds will be managed in accordance with the Minnesota Noxious Wee Law (Minnesota Statutes 18.75-18.91); "prohibited-eradicate noxious weeds" will be managed to less than 1% cover with the primary goal of 0% cover from the initial identification; "prohibited-control noxious weeds" will be controlled in a way that prevents spread of these species.

Short-term management actions (STM) are defined as the desired conditions for management areas in Years 1 through 3 following construction activities (MDNR 2020). Short-term management objectives focus on establishing regionally appropriate perennial vegetation and are as follows.

- **Vegetation Management Action – STM-1.** Install prescribed seed mixes prior to construction as noted above, or if during construction, within the first 6 months following construction during the appropriate seeding window. Install seed mixes during the earliest available optimal seeding window to increase the probability of successfully establishing vegetation.
- **Vegetation Management Action – STM-2.** Establish or maintain > 70% temporary cover in disturbed areas that have not yet been revegetated (e.g., due to weather conditions) with a prescribed seed mix during either the preconstruction or construction phase, in order to meet National Pollutant Discharge Elimination System permit requirements for the Project.
- **Vegetation Management Action – STM-3.** During Year 1, mow to reduce presence of and competition with annual weeds; minimize MDA-listed noxious weed species to $\leq$ 10% cover; minimize weedy species to $\leq$ 50% cover; and establish $\geq$ 25% perennial vegetation cover.
- **Vegetation Management Action – STM-4.** During Year 2, mow to reduce presence of and competition with annual weeds; minimize MDA-listed noxious weed species to $\leq$ 5% cover; minimize weedy species to $\leq$ 30% cover; and establish $\geq$ 50% perennial vegetation cover.
- **Vegetation Management Action – STM-5.** During Year 3, use spot-herbicide applications, spot-mowing, and/or hand-weeding; limit MDA-listed noxious weed cover to $\leq$ 1% of total cover; and limit weedy species to $\leq$ 10% of total cover. Establish $\geq$ 75% perennial vegetation cover.
- **Vegetation Management Action – STM-6.** During Years 1 through 3, seasonally inspect and annually monitor management areas to identify where reseeding may be required. Consider whether modifications to seed mixes are appropriate as additional information about the Site is obtained.

### *4.2.2 Long-Term*

Long-term management actions (LTM) are defined as the desired conditions for management areas in Year 4 through the end of the Project (MDNR 2020). Long-term objectives focus on maintaining regionally appropriate vegetation. Benton Solar's long-term management objectives follow.

- **Objective LTM-1.** Maintain percent of total vegetation cover as follows: perennial vegetation, $\geq$ 85%; state-listed noxious weeds, $\leq$ 1%; and weedy species, $\leq$ 10%.
- **Objective LTM-2.** Manage perennial vegetation through periodic mowing.
- **Objective LTM-3.** Use spot-herbicide applications, spot-mowing, and/or hand-weeding to control patches of noxious and invasive plants. Initiate adaptive management activities if MDA-listed noxious weed cover of "prohibited-eradicate noxious weed" species reaches or exceeds $\geq$ 1% of total cover, or if weedy species cover reaches or exceeds $\geq$ 10% of total cover.

# 5 ESTABLISHMENT AND MANAGEMENT PRESCRIPTIONS

Table 5-1 provides a general timeline of vegetation management activities relative to Project activities.

**Table 5-1. General Timeline of Vegetation Management Activities**

| Activity | Description | Timeframe |
|---|---|---|
| **Obtain seed** | Coordinate with selected vendors to secure seed mix supplies. | During Project permitting to ensure sufficient availability of selected seed mixes. |
| **Site monitoring during Project construction** | Monitor for unexpected site alterations due to Project activities; modify VMP as needed. | Throughout Project construction. |
| **Site preparation** | Prepare seedbeds, control weeds/invasive species, install temporary seed as needed. | Disturbed, inactive areas requiring temporary seeding will be seeded and stabilized in accordance with the Project's SWPPP. Other site preparations will occur prior to permanent vegetation installation. |
| **Permanent seed** | Install permanent seed. | Immediately following site preparation activities or delayed until appropriate seasonal timing. |
| **Establishment maintenance** | Verify desired seed mix vegetation is established after installation for 3 years. | Immediately following installation of permanent seed and throughout the following 3 years. |
| **Long-term maintenance** | Maintain vegetation conditions. | Beginning in Year 4 and continuing throughout the life of the Project. |

# 5.1 Site Preparation

Site preparation will begin immediately following the completion of construction-related ground-disturbing activities. As construction activities progress across the Preliminary Development Area, site preparation activities will follow. Prior to initiating site preparation activities for revegetation activities in any given location within the Preliminary Development Area, that location will be assessed to determine if construction activities have inadvertently altered the hydrology. Indication of potential unplanned alterations to hydrology include poor drainage due to severe compaction, broken drain tiles, and unanticipated surface water flow paths following precipitation events. If no signs of unplanned hydrological alterations are observed, site preparation activities will proceed. If signs of unplanned hydrological alternations are observed, appropriate actions will be implemented to address the concern to the extent practicable before proceeding with site preparation activities.

## *5.1.1 Topsoil and Subsoil Handling*

Monitoring soil segregation and decompaction measures will be one of the ongoing priority activities conducted during construction to minimize handling and prevent impacts to the topsoil. During grading activities, topsoil will be stripped, stockpiled, and labeled, as practicable, to avoid mishandling or mixing with subsoil horizons. 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.

- Topsoil thickness will be field tested by a Minnesota Licensed Professional Soil Scientist prior to earthwork activities within the Preliminary Development Area.
- Benton Solar will work with the soil scientist to label and identify the appropriate salvageable topsoil depth in that area.
- Benton Solar will provide this information and a recommendation on salvage and segregation methods/techniques to the environmental monitor for review and input.

Benton Solar suggests a salvageable topsoil depth of up to 12 inches in thickness; topsoil greater than 12 inches from the soil surface would be treated similarly to the underlying subsoil, unless indicated differently by the soil scientist.

- ***Grading Activities***
    - Topsoil will be salvaged and stockpiled in preselected areas to maintain soil characteristics and prevent undesirable species from establishing.
    - Topsoil stockpiles will be seeded with a desired seed mixture if in place for more than 14 days, or a duration specified in the SWPPP.
- ***Trenching Activities*** (including activities with similar operations of temporary excavations and backfilling)
    - Subgrade material will be backfilled first and compacted, as necessary, followed by backfilling with topsoil and grading to the approximate preconstruction contour.[2]

Compaction will be avoided to the extent possible.

- Topsoil will be backfilled as the top layer to maintain the overall integrity and character of the pre-disturbed areas following earthwork activities where segregation of topsoils/subsoils is required.
- Any excess topsoil material will be re-spread within the Project area at preestablished locations.

Topsoil stockpile volumes and locations will be documented to facilitate backfilling after decommissioning.

### *5.1.2 Mitigating Soil Compaction*

Soils at construction sites are generally compacted as a result of excavation, stockpiling, equipment storage, and equipment traffic; soils high in clay content and those characterized by saturated conditions are more susceptible to compaction. The vegetation manager will assess soil compaction resulting from construction activities prior to permanent seed installation and will implement appropriate measures as needed to support the establishment of permanent seed.

- Decompact soils using a disk and a minimum of two passes in areas of shallow compaction (less than 12 inches).
- Decompact soils with a winged subsoiler or straight ripper shank followed by a disk in areas of deeper, more substantial compaction (greater than 12 inches).

### *5.1.3 Seedbed Preparation*

Following soil decompaction, the vegetation manager will review the area and determine whether additional actions are needed to prepare the seedbed. Benton Solar will complete a soil suitability test prior to installation of permanent seed in areas representative of dominant SMUs in the Site (see Table A-1 in Appendix A). Testing will occur in one, at a minimum, randomly selected sample per dominant SMU. The testing will include an assessment of the soil's nutrient availability profile and presence of herbicide residue. A qualified agronomic laboratory will complete laboratory soils analyses and, if

[2] Benton Solar recognizes that topsoil mixing is both an aesthetic and crop-productivity issue and intends to minimize to the extent practicable topsoil and subsoil mixing during construction, operations, and decommissioning/reclamation. For the purpose of identifying areas where topsoil mixing is a potential issue, the environmental monitor will consider topsoil stockpiles, restored trench excavations, and post-closure restored areas with > 5% area of the soil surface as obvious subsoil inclusions to be out of compliance. Remediation may consist of removal of subsoil and replacement with acceptable topsoil.

necessary, provide recommendations regarding corrective measures necessary to achieve Project objectives in consideration of site-specific soil conditions.

Soils in the Preliminary Development Area have been used for crop production of nitrogen-fixing soybeans and augmented with nitrogen fertilizer for corn. Further, Benton Solar has designed seed mixes to select species and strains that do not require fertilizer, water, or pesticides to establish and maintain. Therefore, no soil amendments are anticipated.

The seedbed should be characterized by smooth, firm, and loose soil that will facilitate seed-to-soil contact during permanent vegetation installation.

- Benton Solar will determine any additional necessary actions to prepare seedbeds following the review of seedbed conditions by the vegetation manager and with consideration of timing.
    - Additional disking and/or ripping will be used to provide a uniform surface when post-grading surface would impact seed installation or growth, as needed.
- Cultipacking will be used to firm the seedbed, depending on seed installation technique and equipment.
- Areas with existing vegetation within proposed planting zones will be mowed to a height of 4 to 6 inches (see Figure 7).
    - Mowing will occur approximately 1 week prior to seed installation; where site conditions such as excessive soil moisture do not allow equipment access, hand mowing may be required to ensure seed can be adequately installed.

Mowing for site preparation is not required in areas where existing vegetation will remain. In such areas, no new seeding will occur.

### 5.1.4 Temporary Seed Mixes and Cover Crops

Temporary site stabilization activities will be implemented in accordance with the Project's SWPPP and/or any other plans related to stormwater management, erosion control, and temporary stabilization. This VMP is supplemental to and does not replace these plans or permits, although the seed mixes described in this VMP should be used to satisfy SWPPP revegetation requirements.

Temporary site stabilization may include seeding appropriate, temporary cover crops consisting of a seasonally appropriate, annual, quick germinating species (Table 5.1-1). Various methods including, but not limited to, a broadcast seeder, air seeder, hydroseeder, or a no-till drill method may be used to seed temporary cover crops.

If necessary for site stabilization, temporary cover crop/stabilization plantings of introduced cool-season grasses can occur anytime adequate soil moisture is present and soil temperatures are above 50°F. Weather forecasts will be monitored to determine when occasional watering may be necessary for temporary seeding occurring in late spring to early fall.

**Table 5.1-1. Suitable Temporary Cover Crops**

| Common Name (scientific name) | Suggested Time of Use | Seeding Rate |
|---|---|---|
| Oats (*Avena sativa*) | Spring and summer | 30–50 lbs/acre |
| Winter wheat (*Triticum aestivum*) | Fall | 50–90 lbs/acre |

| Common Name (scientific name) | Suggested Time of Use | Seeding Rate |
|---|---|---|
| American slough grass (*Beckmannia syzigachne*) (for use in wet areas) | Fall and spring | 7–10 lbs/acre |

Source: University of Minnesota Extension (2023).

Following installation of temporary seed mixes, further actions may be needed for soil stabilization. The SWPPP includes a description of stabilization requirements. Common practices include hydromulching, mulching, and use of erosion control blankets or coir matting.

# 5.2 Seeding and Planting

The following section addresses the installation of native plant communities and applies to both the array management area and the buffer management area. Benton Solar will revise establishment methods as needed to ensure the seed mix used for final reclamation will be established successfully.

## *5.2.1 Seed Mixtures*

Solar energy facilities typically have various requirements or restrictions that constrain the vegetation community being established under and surrounding solar arrays. Such requirements and restrictions may include the following:

- ***Vegetation Height***
    - The height of the vegetation is not to exceed the lower edge of the solar panel when it is fully tilted to the maximum angle to avoid shading of the panel. The Project's lower panel height will be approximately 20 to 24 inches off the ground. Therefore, plant species with maximum growth height of approximately 20 inches are preferred for permanent installation in the solar arrays.
- ***Mowing***
    - Periodic mowing during the growing season may be necessary over the life of the Project to ensure vegetation does not exceed the lower edge of solar panels (see Section 5.2). Installed permanent vegetation must be able to persist under this mowing schedule.
- ***Commercial Seed***
    - A substantial amount of seed mix is required for the successful establishment of permanent vegetation. The selected seed mix must contain species for which sufficient seed quantities are available. In some cases, seed shortages result in the need to use substitutions (see Table 5.2-3).
- ***Microclimate and Shading***
    - Solar arrays cause partial shading and other microclimate effects. The selected species in the seed mix must be sufficiently robust to persist under these conditions.

Benton Solar partnered with the BBHF through the Solar Synergy program to develop specific regionally appropriate seed mixes for the Project (see Appendix A). The Solar Synergy program consists of uniquely designed outcomes that deliver multiple key benefits to projects, including the following:

- **High-value pollinator seed mixtures**

  The BBHF program uses NextGen Conservation custom seed mixtures, which are designed in consideration of no fewer than 15 different factors and project objectives. This ensures that not only are a project's objectives being met, but that the project produces significant pollinator

health and beneficial habitat. Additionally, NextGen Conservation seed mixtures are designed to promote biodiversity, greatly enhance soil health, and improve water quality within a solar site.

To achieve the Project's objectives, two different seed mixes would be installed within two designated areas of the Project area to satisfy goals geared towards pollinator health and beneficial habitat:

- Solar Array Area

  As described above, pollinator species would be selected under special consideration to fulfill growth height requirements, undergo mowing, be able to withstand shading and microclimate effects, and capable of fast establishment. While selection of these pollinator species may be limited due to restrictions and Project requirements, a second seed mix would be designed and installed within an open area or the buffer area.

- Buffer Area

  Due to the limitations the solar array area seed mix may pose, a buffer area seed mix would be designed that would not be confined to solar array vegetation requirements and/or restrictions. The pollinator species within the buffer area seed mix would consist of a diverse mixture of grasses and forbs of various heights and bloom periods.

- **Extensive monitoring of pollinator health**

  The MJV collects baseline and ongoing pollinator and habitat information for Solar Synergy sites on an annual basis. An extensive list of health and habitat outcomes are monitored and recorded including the documentation of which floral resources the pollinators are using within the habitat, which pollinator species are present, and the abundance of milkweed. There is an expected increase in the overall presence of pollinators as well as other wildlife, such as grassland songbirds, at sites using the Solar Synergy program (BBHF 2023).

The following sections described the array management area and buffer management area seed mixes in detail.

## ARRAY MANAGEMENT AREA SEED MIX

Benton Solar will use a low-growing seed mix (Table 5.2-1) for long-term ground cover within the array management area (i.e., solar arrays). Seed mix development was informed by MDNR guidance to meet the following mid-diversity upland standards:

- A minimum seeding rate of 40 seeds/square foot;
- At least 30% of the total seeding rate should be composed of perennial forbs;
- Five or more native grass/sedge species with at least two species of bunchgrass;
- Ten to 15, or more, native forbs with at least three species in each bloom period: Early (April–May), Mid (June–July), and Late (August–October);
- Contain species of each group: cool-season grasses; warm-season grasses; sedges/rushes; legume; and non-legume forbs; and
- Include species of various plant families to support the widest diversity of pollinator species and enhance the overall health of planting.

The array management area mix will provide a community of relatively short-statured native species under solar panels. The seed mix will be composed of approximately 70% grasses and 30% forb species (i.e., wildflowers and legumes) that typically do not exceed a height of 24 inches, to minimize (with

management, including mowing) concerns for shading of and interference with solar panels. In addition, the mixture of native grasses and forbs will help to prevent undesirable vegetation from establishing under solar panels. Potential undesirable vegetation, such as fast-growing broadleaf invasive and noxious plants, will be identified more readily among native grasses as compared to among more high diversity mixtures dominated by forbs. Improved visibility of undesirable vegetation provides opportunities for more targeted treatments and reduced herbicide use in a timelier manner.

Table 5.2-1 provides details on the composition, seed numbers, and seeding rate of the array management area mix.

**Table 5.2-1. Array Management Area Seed Mix Details**

| Component/Species | Scientific Name | Seeds per Square Foot | Seeding Rate (bulk lbs/acre) |
|---|---|---|---|
| Blue grama, alma | *Bouteloua gracilis* | 4.99 | 0.300 |
| Creeping red fescue – boreal | *Festuca rubra* | 3.67 | 0.400 |
| Fowl bluegrass | *Poa palustris* | 4.35 | 0.060 |
| Fowl mana grass | *Glyceria striata* | 2.12 | 0.060 |
| Fox sedge | *Carex vulpinoidea* | 3.31 | 0.100 |
| Path rush | *Juncus tenuis* | 7.35 | 0.020 |
| Plains oval sedge | *Carex brevior* | 2.98 | 0.200 |
| Prairie junegrass | *Koeleria macrantha* | 4.25 | 0.080 |
| Sideoats grama | *Bouteloua curtipendula* | 4.39 | 1.200 |
| Blackeyed susan | *Rudbeckia hirta* | 1.81 | 0.050 |
| Blacksamson | *Echinacea angustifolia* | 0.46 | .080 |
| Dotted gayfeather | *Liatris punctata* | 0.16 | 0.050 |
| False boneset | *Brickellia eupatorioides* | 0.48 | 0.040 |
| Golden alexander | *Zizia aurea* | 0.40 | 0.100 |
| Gray goldenrod | *Solidago nemoralis* | 0.69 | 0.030 |
| Heal all | *Prunella vulgaris* | 1.19 | 0.080 |
| Heath aster | *Symphyotrichum ericoides* | 0.25 | 0.003 |
| Missouri goldenrod, native source | *Solidago missouriensis* | 1.16 | 0.008 |
| Prairie ragwort, native source | *Senecio plattensis* | 0.05 | 0.001 |
| Prairie trefoil | *Lotus purshianus* | 0.16 | 0.100 |
| Purple prairieclover | *Dalea purpurea* | 0.73 | 0.100 |
| Slender beardstongue | *Penstemon gracilis* | 0.25 | 0.001 |
| Upright coneflower | *Ratibida columnifera* | 1.69 | 0.100 |
| Western yarrow | *Achillea millefolium* | 2.29 | 0.035 |
| Whorled milkweed | *Asclepias verticillata* | 0.023 | 0.004 |
| Woolly plantain, native source | *Plantago patagonica* | 0.35 | 0.025 |
| Oats | *Avena sativa* | 4.45 | 10.000 |
| *Grasses Total* | – | 37.397 | 2.420 |
| *Wildflower*/Forb/Legume Total* | – | 16.702 | 10.807 |

| Component/Species | Scientific Name | Seeds per Square Foot | Seeding Rate (bulk lbs/acre) |
|---|---|---|---|
| **Total Mixture** | – | **54.100** | **13.227** |

* Bloom periods include April to May (5 species); June to July (7 species); and August to October (5 species).

#### 5.2.1.1 BUFFER MANAGEMENT AREA SEED MIX

Benton Solar will install a more diversified pollinator seed mix within designated buffer management areas or open areas outside of solar arrays (Table 5.2-2). This seed mix includes native species of varying heights ranging from 1 to 4 feet with bloom times distributed throughout the growing season. Due to the typical height of these species and the potential for such vegetation to shade panels or otherwise impact array performance, this seed mix is proposed within fenced and non-fenced areas only where planting and growth to full height will not impact energy production.

Table 5.2-2 provides details on the composition, seed numbers, and seeding rate of the buffer management area seed mix that Benton Solar may install in buffer management areas or open areas outside of solar arrays.

**Table 5.2-2. Buffer Management Area Seed Mix Details**

| Component/Species | Scientific Name | Seeds per Square Foot | Seeding Rate (bulk lbs/acre) |
|---|---|---|---|
| Big bluestem, Kaw | *Andropogon gerardii* | 0.99 | 0.300 |
| Canada wildrye | *Elymus canadensis* | 1.31 | 0.500 |
| Little bluestem, VNS | *Schizachyrium scoparium* | 2.21 | 0.400 |
| Path rush | *Juncus tenuis* | 11.02 | 0.030 |
| Plains oval sedge | *Carex brevior* | 0.37 | 0.025 |
| Prairie junegrass | *Koeleria pyramidata* | 1.59 | 0.030 |
| Sideoats grama, El Reno | *Bouteloua curtipendula* | 1.83 | 0.500 |
| Ashy sunflower, native source | *Helianthus mollis* | 0.14 | 0.030 |
| Blackeyed susan | *Rudbeckia hirta* | 1.27 | 0.035 |
| Blanketflower | *Gaillardia pulchella* | 1.07 | 0.250 |
| Butterfly milkweed | *Asclepias tuberosa* | 0.04 | 0.025 |
| Canada milkvetch | *Astragalus canadensis* | 0.50 | 0.080 |
| Canada tick-trefoil | *Desmodium canadense* | 0.20 | 0.100 |
| Common evening primrose | *Oenothera biennis* | 1.11 | 0.035 |
| Common milkweed | *Asclepias syriaca* | 0.09 | 0.050 |
| Dotted mint | *Monarda punctata* | 1.01 | 0.030 |
| Entire-leaved rosinweed, native source | *Silphium integrifolium* | 0.02 | 0.030 |
| False or oxeye sunflower | *Heliopsis helianthoides* | 0.48 | 0.200 |
| Foxglove beardstongue | *Penstemon digitalis* | 0.28 | 0.030 |
| Golden alexander | *Zizia aurea* | 0.36 | 0.090 |
| Gray goldenrod | *Solidago nemoralis* | 0.23 | 0.010 |
| Grayhead coneflower | *Ratibida pinnata* | 0.59 | 0.060 |

| Component/Species | Scientific Name | Seeds per Square Foot | Seeding Rate (bulk lbs/acre) |
|---|---|---|---|
| Heal all | *Prunella vulgaris* | 0.90 | 0.060 |
| Hoary vervain | *Verbena stricta* | 0.67 | 0.050 |
| Illinois bundleflower | *Desmanthus illinoensis* | 0.20 | 0.100 |
| Lanceleaf coreopsis | *Coreopsis lanceolata* | 1.27 | 0.250 |
| Late or giant goldenrod, native source | *Solidago gigantea* | 1.39 | 0.008 |
| Missouri goldenrod | *Solidago missouriensis* | 0.87 | 0.006 |
| New England aster | *Symphyotrichum novae-angliae* | 0.48 | 0.020 |
| Plains coreopsis | *Coreopsis tinctoria* | 1.85 | 0.025 |
| Plains sunflower | *Helianthus petiolaris* | 0.12 | 0.045 |
| Prairie aster | *Symphyotrichum falcatum* | 0.47 | 0.050 |
| Prairie cinquefoil | *Drymocallis arguta* | 1.01 | 0.010 |
| Purple coneflower | *Echinacea purpurea* | 0.66 | 0.250 |
| Rattlesnake master | *Eryngium yuccifolium* | 0.14 | 0.035 |
| Rough gayfeather | *Liatris aspera* | 0.13 | 0.020 |
| Roundhead lespedeza | *Lespedeza capitata* | 0.16 | 0.040 |
| Shell-leaf penstemon | *Penstemon grandiflorus* | 0.15 | 0.030 |
| Showy partridgepea | *Chamaecrista fasciculata* | 0.90 | 0.600 |
| Showy-wand goldenrod | *Solidago speciosa* | 0.98 | 0.010 |
| Skyblue aster | *Symphyotrichum oolentangiense* | 0.44 | 0.015 |
| Smooth blue aster | *Symphyotrichum laeve* | 0.58 | 0.025 |
| Stiff goldenrod | *Solidago rigida* | 0.46 | 0.030 |
| Stiff sunflower | *Helianthus pauciflorus* | 0.51 | 0.030 |
| Swamp milkweed | *Asclepias incarnata* | 0.10 | 0.027 |
| Tall boneset | *Eupatorium altissimum* | 0.31 | 0.017 |
| Upright coneflower | *Ratibida columnifera* | 1.02 | 0.060 |
| Western yarrow | *Achillea millefolium* | 1.31 | 0.020 |
| White prairieclover | *Dalea candida* | 0.63 | 0.090 |
| White wild indigo | *Baptisia alba* | 0.02 | 0.040 |
| Wild bergamot | *Monarda fistulosa* | 1.46 | 0.050 |
| Wild quinine | *Parthenium integrifolium* | 0.13 | 0.050 |
| Wild senna | *Senna hebecarpa* | 0.03 | 0.060 |
| Rice hulls - Filler for low planting rate mixtures | | 0.00 | 4.000 |
| *Grasses Total* | – | *19.325* | *1.785* |
| *Wildflower*/Forb/Legume Total* | – | *26.729* | *3.178* |
| *Filler Total* | – | *0.000* | *4.000* |
| **Total Mixture** | – | **46.055** | **8.963** |

* Bloom periods include April to May (7 species); June to July (25 species); and August to October (14 species).

### 5.2.1.2 SUBSTITUTIONS

Benton Solar and BBHF selected individual native species for their attributes appropriate for the specific applications described above. These species also are generally commercially available and have a reasonable chance of successful establishment when managed as outlined in this VMP. Shortages of individual species occasionally occur; therefore, substitutions may be necessary to meet the objectives regarding the number of species in each mix and seeding rates in terms of seeds per square foot and pounds of seed per acre. Benton Solar and its contractors intend to coordinate with the BBHF and applicable agencies regarding proposed species substitutions before seeding commences to ensure that the original vegetation management objectives will still be met.

Table 5.2-3 provides suitable substitute species for Project seed mixes.

**Table 5.2-3. Substitution Seed Mix Species**

| Component/Species | Scientific Name |
|---|---|
| **Grasses** | |
| Fowl bluegrass | *Poa palustris* |
| Fowl mana grass | *Glyceria striata* |
| **Forbs** | |
| Canada milkvetch | *Astragalus canadensis* |
| Canada tick-trefoil | *Desmodium canadense* |
| Common evening primrose | *Oenothera biennis* |
| Common milkweed | *Asclepias syriaca* |
| Entire-leaved rosinweed, native source | *Silphium integrifolium* |
| False boneset | *Brickellia eupatorioides* |
| False or oxeye sunflower | *Heliopsis helianthoides* |
| Foxglove beardtongue | *Penstemon digitalis* |
| Golden alexander | *Zizia aurea* |
| Gray goldenrod | *Solidago nemoralis* |
| Grayhead coneflower | *Ratibida pinnata* |
| Heath aster | *Symphyotrichum ericoides* |
| Illinois bundleflower | *Desmanthus illinoensis* |
| Late or giant goldenrod, native source | *Solidago gigantea* |
| New England aster | *Symphyotrichum novae-angliae* |
| Plains coreopsis | *Coreopsis tinctoria* |
| Plains sunflower | *Helianthus petiolaris* |
| Prairie aster | *Symphyotrichum falcatum* |
| Prairie cinquefoil | *Drymocallis arguta* |
| Purple coneflower | *Echinacea purpurea* |
| Rattlesnake master | *Eryngium yuccifolium* |
| Rough gayfeather | *Liatris aspera* |
| Roundhead lespedeza | *Lespedeza capitata* |

| Component/Species | Scientific Name |
|---|---|
| Shell-leaf penstemon | *Penstemon grandiflorus* |
| Showy partridge pea | *Chamaecrista fasciculata* |
| Showy-wand goldenrod | *Solidago speciosa* |
| Skyblue aster | *Symphyotrichum oolentangiense* |
| Slender beardtongue | *Penstemon gracilis* |
| Smooth blue aster | *Symphyotrichum laeve* |
| Stiff goldenrod | *Solidago rigida* |
| Stiff sunflower | *Helianthus pauciflorus* |
| Swamp milkweed | *Asclepias incarnata* |
| Tall boneset | *Eupatorium altissimum* |
| Upright coneflower | *Ratibida columnifera* |
| Western yarrow | *Achillea millefolium* |
| White wild indigo | *Baptisia alba* |
| Whorled milkweed | *Asclepias verticillata* |
| Wild quinine | *Parthenium integrifolium* |
| Wild senna | *Senna hebecarpa* |

### 5.2.2 Timing

Dormant seeding generally is preferred because it reduces initial competition with established plants, allows species to cold stratify properly, and allows seeds to germinate in the spring at the earliest opportunity, which further decreases competition. Dormant seeding can occur within both array and buffer management areas after November 1 until the ground freezes. Seeding rates should be increased by 25% for dormant seeding to account for losses due to wildlife consumption and decreased germination rates after winter.

If seeding occurs during the growing season, the optimal time to plant seeds is between April 1 and July 1. Table 5.2-4 provides a summary of options for seeding timing and installation methods for both array and buffer management areas. The vegetation manager will monitor weather forecasts to determine when occasional watering may be necessary for permanent seeding occurring in late spring to early fall.

**Table 5.2-4. Summary of Seeding Timing and Installation Methods**

| General Timing | Methods | Justification |
|---|---|---|
| April 1 – May 31 | Air seeder or hydroseeder, no-till drill, broadcast seeder | Seed can be installed once soil temperatures reach 60°F |
| June 1 – June 30 | Air seeder or hydroseeder, no-till drill, broadcast seeder | Not preferred, but vegetation manager may approve seed installation before summer heat |
| July 1 – November 1 | Air seeder or hydroseeder, no-till drill, broadcast seeder | Temporary seed mix/cover crop, if needed (no Management Area mix seeding during this period) |
| November 1 – ground freeze | No-till drill (recommended) or broadcast seeder | Dormant seeding after soil temperature drops below 50°F; use winter wheat as a cover crop |
| Ground freeze – April 1 | None | Not recommended |

Note: Timing and method based on MDNR (2020) recommendations for native seeding in southern Minnesota.

There may be a gap between the season/time at which site preparation activities are complete and the optimal seeding window for installation of permanent seed mixes. One strategy to cover this gap is to install a seasonally appropriate temporary cover crop per guidelines outlined in Table 5.1-1. The temporary cover crop will stabilize such locations and assist in suppressing undesirable vegetation from establishing. Once the appropriate seeding window arrives, the temporary cover crop can be removed, if necessary, through herbicide application or rough-cut mowing. Selection of the most appropriate seeding method for permanent seed mixes (see Section 5.2.1) should consider the presence of temporary cover crops and/or plant debris.

#### 5.2.2.1 PERMANENT SEEDING PRIOR TO INFRASTRUCTURE INSTALLATION

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 in all disturbed areas prior to installation of Facilities. Although seeding before Facilities are installed may result in decreased seed-to-soil contact related to equipment maneuvering, this approach allows native vegetation to begin root development and establishment concurrent with installation of Facilities. This approach offers advantages related to the initial seeding phase on undeveloped areas, such as reducing the labor intensity of necessary seeding methods.

If Benton Solar opts to install seed prior to Facility installation, it is anticipated that soil disturbance during construction will damage some seeded areas, particularly in heavily trafficked areas. This may be especially likely in wet areas or during wet soil conditions. This may necessitate preparing a seedbed and limited supplemental reseeding following installation of Facilities. To minimize disturbance of seeded areas, it is recommended that rubber-tracked, rather than rubber-tired, equipment be used during construction as practicable.

Following installation of permanent seed mixes, further actions may be needed for soil stabilization. The SWPPP includes a description of stabilization requirements. Common practices include hydromulching, mulching, and use of erosion control blankets or coir matting.

#### 5.2.2.2 PERMANENT SEEDING FOLLOWING INFRASTRUCTURE INSTALLATION

If site preparation and final grading are not completed prior to June 30, or if Benton Solar opts not to install permanent 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). Seed application the following spring would adhere to methods described in Section 5.2.3. The MDNR (2020) recommends that fall dormant seedings occur after soil temperatures reach 50°F or below. If construction is completed in late fall, allowing for seeding after November 1 and before soils freeze, seed mixes will include approximately 30 pounds live seed per acre of winter wheat to provide a temporary nurse crop for the following year (instead of oats as a cover crop). A seeding in the following spring may be substituted for the fall dormant seeding. However, installing seed in the same year as Facility installation is preferred to facilitate early spring vegetative establishment and advance the timeline for terminating Site construction stormwater permits and monitoring requirements.

Following installation of permanent seed mixes, further actions may be needed for soil stabilization. The SWPPP includes a description of stabilization requirements. Common practices include hydromulching, mulching, and use of erosion control blankets or coir matting.

## 5.2.3 Seeding Methods

To properly conduct on-site seeding techniques, weather and site conditions must be suitable for the selected seeding method to ensure an adequate seeding rate and to minimize soil clodding or mixing. The vegetation manager is expected to use their expertise in recommending modifications to the proposed seed applications and methods. Once the seedbed has been prepared as outlined in Section 5.1.3, seed installation methods should be implemented as follows:

### 5.2.3.1 SEED INSTALLATION

Installation of seed mixes within both array and buffer management areas will consist of the following:

- Seed application at proper rates per acre.
- Sowing seed at a maximum depth of 0.13 to 0.25 inch into the soil.
- The seed mix and any inert material must be thoroughly mixed at the time of installation.
- Appropriate permanent seed installation equipment as determined by the vegetation manager.
    - If mowing and thatch removal is not completed prior to seeding, permanent seed installed within existing vegetation (e.g., cover crops) may be installed by a drill and may be necessary within the solar array where installation via a driller seeder is not feasible.
- It is preferred that seed be installed in two perpendicular passes. However, if the Project layout does not allow for two perpendicular passes, the seed can be installed in one pass.
- Broadcast seeding at a 1.5x seed rate is appropriate for segments of the Project area that are inaccessible to drill seeding equipment.
    - May require raking of seeds to ensure good seed-to-soil contact.
    - This method is best applied during non-windy conditions.
- A cultipacker must be used following seed installation to ensure a firm seedbed, and increased seed-to-soil ratios and corresponding seed germination rates.

**Equipment**

Several types of equipment can be used to install seed and can be used for any of the seed mixes described in this VMP. The vegetation manager will evaluate the Site to determine what equipment will produce the best results and can operate safely within the Site. When using this equipment, it is important that the Site be prepared as described in Section 5.1 to ensure a high seed-to-soil contact ratio, which is critical to successful germination. Seed installation equipment may include and is not limited to the following:

- No-till grass drill
- Cultipacker
- Air seeder or hydroseeder
- Broadcast seeder

# 5.3 Vegetation Management

## *5.3.1 Establishment: Years 1 through 3*

Establishment within the array and buffer management areas will typically occur over the three growing seasons following seed installation. Management activities implemented during the first three growing seasons (e.g., "years") are intended to control noxious and invasive weeds, facilitate seed establishment, and support meeting the performance criteria found in Table 4.2-1. These management activities differ from the long-term management activities described in Section 5.3.2.

If seeds are installed during the growing season and prior to mid-September, that year would be considered Year 1. If seeds are installed after the growing season ends (approximately early November), germination of the seed is likely to occur in the following spring. In that case, the following spring would mark the beginning of Year 1. Annual forbs should establish within the first growing season. Perennial grass and forb species may not become apparent during the first growing season and may require up to 3 years to establish.

### 5.3.1.1 YEAR 1

Year 1 management activities focus on noxious and invasive weed control. During Year 1, native vegetation prioritizes root development and seedlings may reach only 4 to 6 inches in height. Mowing will prevent noxious and invasive weeds from adding new seeds to the soil and will begin to exhaust the soil seed bank, a process that can require several years. Project-wide mowing will occur as described in Table 5.3-1. The actual mowing frequency and timing will depend on when seeding was completed and on weather and Site conditions and will be determined by the vegetation manager. Benton Solar will remain flexible and adaptive regarding mowing frequency and timing to accommodate factors that cannot be predicted or that are beyond Benton Solar's control. For example, fewer mowings may be needed in a dry year and more mowings may be appropriate in a wet year. However, wet conditions also may prevent mowings during optimal times. Mechanized mowing will not be conducted when soil is saturated, as this could result in rutting, compaction, and/or soil displacement. Such disturbances could create localized areas of seed failure and/or invasive species establishment. To avoid this, Benton Solar will do one of the following:

- Postpone mechanized mowing until soils are not saturated;
- Use small equipment or equipment with flotation tires to avoid impacts to soil; or
- Use handheld equipment (e.g., brush cutters).

During all mowing events described in this VMP, the vegetation manager will take measures to avoid destroying ground-nesting bird nests during the nesting season (approximately May 15 to August 1).

Repeated mowing has potential to create a build-up of organic thatch that discourages the establishment of installed seed mixes. To avoid or minimize this build-up, mowing will be conducted with a flail-type mower that mulches the cut vegetation. A swing arm designed for mowing under solar panels is recommended. Spot-mowing with brush saws, weed whips, and similar equipment may also be appropriate in some areas.

Benton Solar will approve mowing techniques not addressed specifically in this VMP prior to implementation. The vegetation manager will clean mowing equipment prior to each use to prevent the introduction of invasive species.

**Table 5.3-1. Mowing Recommendations During Establishment Years 1 through 3**

| Seed Mix | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Array Management Area Mix | Site-wide mowing to a height of 4 to 6 inches will occur as needed according to Site and weather conditions, and prior to weeds setting seed. Several mowing events may be needed. Mowing should occur when vegetation is between 18 and 24 inches in height. The vegetation manager will use appropriate equipment to reduce potential organic thatch build-up that may discourage the establishment of installed mixes. Herbicides may be used to treat perennial weeds. | Site-wide mowing to a height of 4 to 6 inches will occur one to two times in the growing season, according to Site and weather conditions, and prior to weeds setting seed. The vegetation manager may utilize spot-mowing to treat specific problem areas as needed and will conduct a minimum of two herbicide applications to treat noxious and perennial weeds. | Spot-herbicide applications may be used to control the remaining small patches of persistent weeds. Spot-mowing and hand-weeding may also be used. |
| Buffer Management Area Mix | Mow when vegetation reaches 12 to 18 inches in height and cut to a height of 4 to 6 inches. Up to three mowing events may be required depending on Site and weather conditions. | Mow when vegetation reaches 18 to 24 inches and cut to a height of 10 to 12 inches. One or more mowing events may be required depending on Site and weather conditions. | A single mowing event should occur prior to the start of the growing season during the dormant season (i.e., from November through March). Mow dormant vegetation to a height of 4 to 6 inches. This will remove the previous growing season's vegetative growth and accelerate decomposition of accumulated thatch. |

In addition to mowing, noxious and perennial weeds may be treated through the application of herbicides, as described below, to prevent roots from resprouting.

#### 5.3.1.2 YEAR 2

The second year of establishment continues to focus on noxious and invasive weed control but incorporates more targeted techniques. By this time, native grasses should have begun to form clumps but remain short, and some flowering should occur throughout the growing season. Site-wide mowing to a height of 4 to 6 inches one to two times between late spring/early summer, prior to weeds setting seed (see Table 5.3-1).

The vegetation manager may conduct spot-mowing to treat specific noxious and invasive weed areas, as needed. The vegetation manager will treat noxious and invasive weeds with at least two spot-herbicide applications.

#### 5.3.1.3 YEAR 3

In the third year of establishment, noxious and invasive weed control will consist of spot-herbicide applications to control remaining patches of persistent noxious and invasive plants. The vegetation manager also may utilize spot-mowing or hand-weeding, if needed (see Table 5.3-1).

### *5.3.2 Long-Term: Year 4 to End of Project*

The establishment period should be complete following Year 3. At this time, installed seed mixes should be sufficiently established and management areas will enter long-term management beginning with year 4. The vegetation manager will complete inspections approximately twice annually (June and September) in Year 4 and in all subsequent years to determine whether, and what, maintenance is needed.

Additionally, the MJV will conduct annual monitoring for up to 6 years to collect data that informs and supports conservation efforts for monarch butterflies and other pollinator species.

If establishment is considered incomplete by the end of Year 3 (e.g., presence of bare soil, areas with poor establishment of species in the installed seed mix, dense stands of invasive species), Benton Solar may implement adaptive management measures (Section 6.4).

The vegetation manager will manage installed vegetation to ensure the established vegetation persists over the life of the Project and that it does not interfere with safe and reliable power generation. The primary management tools will be continued mowing and herbicide application. Because healthy native and perennial herbaceous vegetation depends on disturbance, mowing should be implemented at least once per season on one-third of the management areas and be cut to a height of 4 to 6 inches (MDNR 2020). The vegetation manager may remove mowed vegetation if thatch build-up that might suppress healthy vegetation is observed. Mowed sections should not be mowed in consecutive years. At this time, Benton Solar anticipates between zero and three mowing events may be required per year. The vegetation manager will determine the actual number of mowing and herbicide application events in consideration of relevant variables including Site conditions, weather, seasonal variations, and encroachment of woody vegetation. The seed mixes have been designed to persist under such management conditions.

### 5.3.3 Reseeding of Poorly Established Areas

Reseeding will occur in locations with 1) bare soil and/or 2) poor establishment of species in the installed seed mix. Areas of bare soil provide an opportunity for the undesirable species described above to colonize and spread. Bare soil also can contribute to overall soil loss through erosion. Such erosion could prevent Benton Solar from terminating its construction stormwater permit in a timely manner. Therefore, observed areas of bare soil may be reseeded with the seed mix previously installed or identified in coordination with the BBHF and applicable agencies, and installation will follow applicable methods (Section 5.2.3). Areas may be overseeded at half the normal seeding rate. If bare soil or poor establishment/thin cover of installed species persists, Benton Solar may coordinate with a professional to identify appropriate remediation actions.

### 5.3.4 Invasive Species Management

Activities that require grading or decompaction of soils or that otherwise disturb soils have potential to promote the establishment of undesirable species, such as noxious weeds or invasive species, which have remained present within the seedbank in the soil. Invasive plant species, including MDA-listed noxious weeds and other weedy species, can negatively impact the establishment and persistence of seeded native and desirable vegetation, and management of such undesirable species for extended periods of time may prevent accomplishing vegetation management goals and objectives. MDA-listed noxious weeds are prohibited in Minnesota (MDA 2023a); Benton County does not recognize any species as invasive or noxious in addition to the state list (MDA 2023b).

The preferred strategy for preventing and controlling MDA-listed and invasive species (i.e., undesirable vegetation) is to initiate control measures beginning with the start of construction activities. Control measures may include, but are not limited to:

- Require that construction equipment comes to the construction area be free of soil and existing vegetation, and that equipment also leaves the Preliminary Development Area free of soil and vegetation;
- Require contractors to self-inspect all equipment arriving and departing the Preliminary Development Area and request proof of inspection upon request;

- Identify a wash station designated for cleaning equipment and monitor cleaning areas for presence of invasive species;
- Survey construction areas prior to beginning construction activities to determine presence of MDA-listed noxious weeds, other invasive plants species, and native vegetation. Identify on mapping and with signs where noxious weeds are located to prevent equipment from picking up and spreading seed and plant parts;
- Monitor the Preliminary Development Area on a seasonal basis to identify, map, and treat areas where invasive species are present; and
- In areas of known invasive species, make herbicide treatment a priority before appropriate seed mix is installed.

Undesirable vegetation, if identified, also may be controlled prior to seeding on a species-specific basis using appropriate methods such as herbicide application or timed mowing. Herbicide application may be most appropriate for control of perennial species, whereas mowing may be most appropriate for control of annual or biennial species, as mowing such species prior to seed production is critical to control and eradication.

Revegetation and vegetation management practices on utility-scale solar facilities may express a suite of undesirable plant species, including the existing seedbank and seed vectors from the adjacent properties. During vegetation monitoring, the vegetation manager and/or its contractors will identify undesirable vegetation and make recommendations for implementing control and removal treatments, where necessary. The vegetation manager will tailor control methods to vegetation, as follows.

- **Annuals or biennials**
    - Mowing prior to seed production may be sufficient to control annual or biennial plants.
- **Perennials**
    - Spot-herbicide applications may be required to control perennial species.
- **Grass-based plants**
    - If the target species is a grass-based plant species, the vegetation manager may use grass-selected herbicide (e.g., clethodim).
- **Broadleaf species**
    - The vegetation manager may use a broadleaf-selective herbicide (e.g., 2,4-D, triclopyr) to treat broadleaf species.
- **Various**
    - A non-selective herbicide may be used to control any undesirable vegetation. Non-selective herbicides with active ingredient(s) such as glyphosate may be used on a spot-treatment basis. The herbicide application will target the specific plant species, and applications will avoid contact with and impact on installed vegetation.

When revegetating areas with a history of row-cropping, both annual and perennial noxious weeds and invasive plant species will be a primary threat to successfully establishing native, desirable vegetation due to potentially existing seedbanks and from potential seed vectors in adjacent row-crop areas. Mowing and herbicide treatments that are completed prior to seed development are effective means to control annual weed species and reduce the spread of perennial weed species. Well-established regionally appropriate, grass-dominated vegetation (Years 4+) may be less susceptible to noxious weed and other invasive species establishment; however, it is anticipated that invasive species management will be an ongoing priority for vegetation management throughout the life of the Project. Within the Preliminary

Development Area, the period between construction and vegetation maintenance is when the management areas will be most vulnerable to invasive species establishment.

Problematic plant species may also include native plant species that present the potential to interfere with Project function. These plants may be present in the soil seedbank or may enter the Preliminary Development Area through seed rain from adjacent properties. Problematic native plants with potential to shade solar panels will be controlled through mowing. Vining species may be manually pulled and removed. Woody vine species will be cut to within 1 inch of the ground and the stump will be treated with an appropriate herbicide (e.g., glyphosate, triclopyr). Cut woody species and brush will be removed from the Preliminary Development Area and disposed of appropriately.

Herbicides will be applied by a licensed applicator, if required, and in accordance with the herbicide label directions for the target species and application site conditions. If undesirable species exist within or adjacent to aquatic resources, the applicator will use an aquatic-approved herbicide. Herbicide application will occur at least 2 weeks before the final seeding installation. Herbicide application is not required in areas where existing vegetation will remain (e.g., ditches). In such areas, no new seeding may occur. Benton Solar will complete a survey regarding pesticide use among participating landowners to determine whether potential carryover (i.e., herbicide drift) is likely to be an issue that prevents or impacts installed seed germination rates. Where herbicide drift is determined to have potential to impact revegetation practices and vegetation management, Benton Solar will consider the extended use of temporary cover crops or other carryover resistant vegetation until the potential for residual effects is considered minimal or unlikely. Benton Solar will coordinate with a qualified vegetation manager in making determinations regarding the potential for pesticide carryover.

# 6 MONITORING AND ADAPTIVE MANAGEMENT

## 6.1 Construction

In accordance with Benton Solar's Agricultural Impact Management Plan (AIMP), an environmental monitor will be on-site during all construction activity to ensure compliance with all associated Project-specific permits and plans, and to conduct ongoing vegetation monitoring. The environmental monitor will focus specifically on reducing construction-related impacts such as soil compaction and erosion. The vegetation manager will be responsible for overseeing and/or implementing the monitoring strategies outlined below.

## 6.2 Establishment: Years 1 through 3

The vegetation manager will complete quantitative and qualitative monitoring approximately every 8 weeks during the growing season (May–October) following seed installation and until the Site is considered fully established per the performance criteria established in Section 4.2. Additionally, the MJV through the Solar Synergy program will collect baseline and ongoing pollinator and habitat information on an annual basis. An extensive list of health and habitat outcomes will be monitored and recorded including the documentation of which floral resources pollinators are using within the habitat, which pollinator species are present, and the abundance of milkweed. Benton Solar will use standard and approved monitoring methods to ensure the resulting assessments are informed and objective.

Monitoring vegetation establishment, identifying issues, and prescribing corrective actions through adaptive management (see Section 6.4), if needed, are important steps in meeting Project objectives. For example, if the vegetation manager observes that the vegetation is not sufficiently establishing during

Year 3, the mowing regime described for Year 2 also may be implemented in Year 3. The vegetation manager will be responsible for: 1) identifying when adaptive management may be needed relative to the performance criteria established in Section 4.2; and 2) describing what measures are likely to be most appropriate and effective.

Monitoring, evaluations, and adaptive management also will inform the necessary frequency of these activities during long-term management.

## 6.3 Long-Term: Year 4 to End of Project

The establishment period should be complete following Year 3. At this time, installed seed mixes should sufficiently be established and the Project area will enter long-term management beginning with Year 4. The vegetation manager will complete inspections approximately twice annually (June and September) in Year 4 and in all subsequent years to determine whether, and what, maintenance is needed. Additionally, monitoring will be conducted annually by the MJV for up to 3 additional years (beyond the establishment phase) to collect ongoing data that informs and supports conservation efforts for monarch butterflies and other pollinator species.

If establishment is not considered complete by the end of Year 3 per the performance criteria established in Section 4.2 (e.g., presence of bare soil, areas with poor establishment of species in the installed seed mix, dense stands of invasive species), Benton Solar may implement adaptive management measures, if needed (see Section 6.4).

## 6.4 Adaptive Management

Benton Solar may implement adaptive management measures. Such measures may include:

- Selective use of herbicide to control localized occurrences of invasive species;
- Additional soil sampling and reseeding in areas of seed failure;
- Modification of seed mixes to include other species that may have a greater chance of success as determined in coordination with the BBHF and applicable agencies;
- Additional mowing in areas where vegetation establishment is slow, or where reseeding was necessary; or
- Interseeding of additional forb seeds to increase the diversity of plants that provide floral resources for pollinators in areas where grasses and sedges are dominant with few forb species established.

Benton Solar will assess data collected during monitoring to demonstrate trends or progress towards meeting and maintaining management objectives. If, following the establishment period, a management area is not meeting its defined objectives, Benton Solar will develop a specific work plan for that management area. The work plan will include revised management actions to achieve objectives that are supported by spatially represented problem areas and to be displayed or shared electronically. Every 3 to 5 years, Benton Solar will evaluate monitoring data collected and monitoring protocols to determine whether changes to either are warranted. Reasons to update data collected or monitoring protocols include:

- Changes to reporting requirements for permit compliance;
- Need for different or additional information to effectively inform management decisions; or

- New developments in technology or data analysis (e.g., use of unpiloted aerial vehicles, artificial intelligence).

# 7 ANNUAL REPORTING

Benton Solar will prepare an annual monitoring report addressing each growing season. The annual report will include, and not be limited to, the following:

- A description of Site conditions;
- A summary of quantitative and qualitative monitoring results;
- A summary of management activities, including adaptive management actions, implemented during the reporting period intended to meet objectives by management area/unit;
- A description of challenges or unforeseen circumstances (e.g., unanticipated weather events) that the Project faced during the reporting year and how these challenges may have affected vegetation establishment;
- Representative photographs of the management area vegetation; and
- KMZs or shapefiles of mapped areas containing invasive/noxious weeds or significant bare soil areas.

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# APPENDIX A

## Soils Summary Table

**Table A-1. 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 in | 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 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 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 | Moderate | Slight | Predominantly nonhydric | 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 |
|---|---|---|---|---|---|---|---|---|---|
| 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 (2023a).

* Totals may vary slightly due to rounding.

# APPENDIX E

# Decommissioning Plan

# Decommissioning Plan for the Benton Solar Project in Benton County, Minnesota

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

**AUGUST 2024**

PREPARED FOR

**Benton Solar, LLC**

PREPARED BY

**SWCA Environmental Consultants**

# DECOMMISSIONING PLAN
# FOR THE BENTON SOLAR PROJECT
# IN BENTON COUNTY, MINNESOTA

Prepared for

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

August 2024

# CONTENTS



## Appendix



## Figure



## Table

# 1 INTRODUCTION

Benton Solar, LLC (Benton Solar), 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 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. Benton Solar anticipates a commercial operations date by the fourth quarter of 2027.

## 1.1 Plan Objectives

Commission Site Permits for large electric power generating plants require permittees to dismantle and remove project-related facilities and restore sites in accordance with a decommissioning plan. Permittees are required to file decommissioning plans with the Commission prior to commercial operation. The objective of this decommissioning plan is to ensure that the Site is restored to approximate preconstruction conditions in coordination with the landowner at the end of the Project's useful life or the expiration of the Site Permits (Commission Docket Nos. IP7115/GS-23-423 and IP7115/ESS-24-283), and that the restoration costs are borne by Benton Solar in accordance with the Site Permits and state laws. This decommissioning plan for the Project has been prepared to provide the following content per the Site Permit requirements:

- The anticipated life of the Project;
- The estimated decommissioning costs in current dollars;
- The method and schedule for updating the costs of decommissioning and restoration;
- The method of ensuring that funds will be available for decommissioning and restoration; and
- The anticipated manner in which the Project will be decommissioned and the Site restored.

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

[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 0.5 mile) exceed the thresholds provided in the definition.

This plan describes in detail those activities, including the means and methods for removal of all Facilities and restoration of the Site to approximate preconstruction conditions, that Benton Solar will complete upon decommissioning. This decommissioning plan applies solely to the Project.

The Site is located 4.0 miles east of St. Cloud in Minden Township, Benton County, Minnesota, in a rural setting. Specifically, the Site is located in Township 36 North, Range 30 West, Sections 13 and 23–26.

Residences and small businesses are scattered throughout this rural area and land use is primarily agricultural. Additionally, existing transmission lines are located in the Site. The Site is generally bounded to the north by County Highway 50 (30th Street NE); to the east by County Highway 25 (75th Avenue NE); to the south by 2nd Street SE; and to the west by 55th Avenue NE.

## 1.2 Plan Updates

The anticipated life of the Project is 25 to 30 years. Benton Solar does not anticipate that the Project will be decommissioned sooner. However, decommissioning schedule updates will be provided in decommissioning plan updates. Benton Solar will update this decommissioning plan at the following times:

- Prior to construction;
- Every 5 years during Project operation; and
- At milestones such as a change in ownership and/or Site Permit amendment.

## 1.3 Project Description

The Project's preliminary Site design is shown in Figure 1, and Facilities and estimated dimensions are provided in Table 1. Information is based on the preliminary Site plan. Final design and construction of the Project may result in changes.

All associated 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 (see Table 1). Secure fencing will encompass all Facilities within the Preliminary Development Area. 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 system, meteorological evaluation tower, stormwater basins, and temporary features [e.g., laydown yards]).

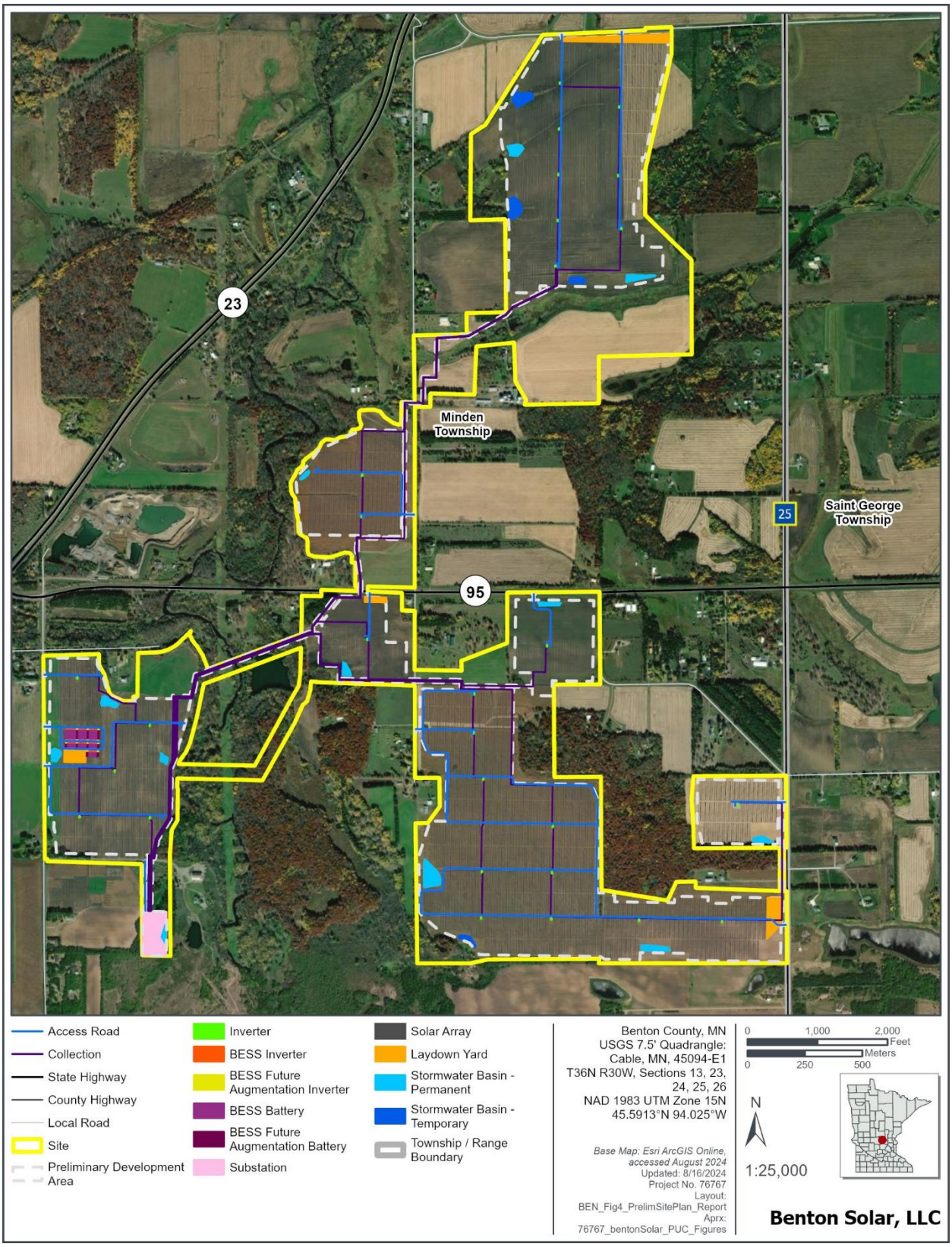


**Figure 1. Benton Solar Project location and preliminary Site plan.**

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, 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 which 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. From the power conversion system, power will flow to the substation via medium-voltage cables that will be installed underground.

**Table 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 |

| Facility | Acres* | |
|---|---|---|
| | **Long-term Impacts** | **Short-term Impacts∞** |
| Power conversion units | 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. It is included here for totality of the Project description.

∞ Disturbances will be short-term, and areas will be restored as described in the Joint Site Permit Application (Commission Docket Nos. IP7115/ESS-24-283) following completion of construction.

### *1.3.1 Use of Power*

Benton Solar submitted an interconnection request into the Midcontinent Independent System Operator (MISO) Definitive Planning Phase study process in 2019 and has an executed Generator Interconnection Agreement with MISO (dated December 7, 2022). Benton Solar is in the process of filing a surplus agreement with MISO for the BESS.

# 2 DECOMMISSIONING

Upon one of the decommissioning triggers listed in Section 2.1, Benton Solar will initiate the decommissioning and Site restoration process described in this plan. Benton Solar will implement all decommissioning activities in accordance with this plan, required state and local permits, and other Project plans (see Section 3).

## 2.1 Triggers

Decommissioning will be required under any of the following circumstances:

- The Site Permit expires, without renewal of said permit;
- Substantial action on construction of the Project is discontinued for a period of 12 consecutive months; or
- The Project does not generate electricity for a period of 12 consecutive months.

Benton Solar will notify the Commission, Benton County, other permitting authorities, and involved landowners if and when the Project is discontinued and decommissioning activities are planned to begin.

## 2.2 Schedule

Benton Solar anticipates that the decommissioning process will occur over a 5- to 9-month period depending on such conditions as seasonality and weather. Depending on the timing and the requirements

for revegetation, it is possible that revegetation and associated monitoring and maintenance efforts could extend beyond 9 months after all other decommissioning tasks are complete. Benton Solar assumes that no decommissioning work will be performed during a portion of winter months or during inclement weather (e.g., high winds, heavy rains).

## 2.3 Removal

Prior to decommissioning, participating landowners will be consulted to determine their desired future land use across the Site. Some Facilities, such as access roads, may be left in place if agreed to by the landowner. Decommissioning includes removal of Facilities as described below. All receiving facilities described below will be licensed or certified to accept the specific types of equipment and material discussed. 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 other appropriate disposal method at an appropriate facility. Benton Solar will assess resale options when the decommissioning plan is updated. Each solar panel for the Project measures 7.5 feet × 3.75 feet and weighs 64.0 pounds. The Project will have 260,208 solar panels. Panels can be easily disconnected, removed, and packed.
- **Racking:** Racking components will be disassembled and removed from steel foundation posts, sorted by size, and sent to a metal recycling facility. It is assumed that the racking structures weigh approximately 15.0 pounds per linear foot of array. The Project will include 1,047,792.0 linear feet of array, for a total weight of 7,858.0 tons. The racking making up the arrays is made of steel pipes. A crew with hand tools will disassemble and cut the pieces to sizes appropriate for recycling.
- **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). The underground collector system cables are placed in trenches with a minimum of 18.0 inches of cover. Several cables/circuits are placed side by side in each trench. The conduits and cables can be removed by trenching. 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. The power conversion units will consist of inverter(s), a transformer, and a panel on a metal frame 19.0 feet long × 8.0 feet wide by × 8.5 feet tall. The power conversion units weigh approximately 32,000.0 pounds and will be disconnected by a crew of electricians. Transformers, which contain copper or aluminum windings, will be lifted by a mobile crane for transport to the recycling facility. Medium-voltage equipment and supervisory control and data acquisition equipment, enclosed in weatherproof cabinets, are mounted on the same equipment skids as the inverters and transformers. Their smaller size requires lighter equipment for removal.
- **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). 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. All concrete foundations will be removed unless directed otherwise by the landowner. Gravel from road removal will be used to backfill to within 6.0 inches of final grade and then completed with up to 6.0 inches of topsoil on all disturbed areas where necessary to achieve approximate preconstruction conditions. Concrete foundation removal will be accomplished with the use of excavators with concrete breakers. Processed concrete will be transported off-site under the same assumptions as road gravel. Clean concrete will be crushed and disposed of off-site or recycled and reused on- or off-site.

- **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 located on agricultural land, assumed to be 50.0% of roads, will not be reseeded. 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, switch gear, 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 basins:** Benton Solar will grade stormwater pond areas to match surrounding contours and drainage patterns as much as possible, 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.

## 2.4 Waste Disposal

Benton Solar will dispose of materials by means of reconditioning, salvage, recycling, and disposal based on the removal and disposal details discussed herein. Benton Solar will then transport components and material to appropriate reconditioning, salvage, recycling, or disposal facilities in accordance with applicable state and federal law. For example, Benton Solar identified a metal recycling facility (EMR Northern Metal Recycling) in Becker, Minnesota, 15.0 miles from the Site. Benton Solar may haul recycling materials to this facility. If this particular facility is not in operation at the time of decommissioning, Benton Solar expects another facility would be. Benton Solar will identify the locations of facilities with the required certifications and ability to process materials during plan updates (Section 1.2). Modules sent for disposal will be sampled and tested using accepted test methods to

determine whether they must be managed as a Resource Conservation and Recovery Act Hazardous Waste.

These activities will occur throughout and within the Site as sequencing of decommissioning progresses.

## 2.5 Restoration

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 plan, 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 best management practices to minimize adverse impacts, such as erosion and sediment runoff, to the extent practicable. BMPs 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 groundwater movements.
- Stabilize soils and return them 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 in accordance with the Project's agricultural impact mitigation plan (see Appendix C of the Joint Site Permit Application [Commission Docket Nos. IP7115/ESS-24-283]), as well as designate and separate from other excavated material. 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 practical. 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 in accordance with the stormwater pollution prevention plan (SWPPP).

## 2.6 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 earthmoving 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 PERMITTING

All decommissioning and restoration activities will comply with federal and state permit requirements at the time of decommissioning. Decommissioning activity that will disturb more than one acre of soil may trigger the National Pollutant Discharge Elimination System Construction General Permit process. A SWPPP will be developed prior to filing a Notice of Intent. Permit(s), if required, shall be applied for and received prior to commencing decommissioning activity. If no discharge of dredged or fill material into a water of the United States takes place, neither a Section 404 permit from the U.S. Army Corps of Engineers nor a Wetland Conservation Act (WCA) permit will be necessary for decommissioning. The U.S. Army Corps of Engineers and the local governmental unit implementing the WCA will be notified in advance of the decommissioning work to verify the need for Section 404 or WCA permitting. If Section 404 permitting is required, a state Water Quality Certification permit will be required as well. State of Minnesota air quality rules will also be reviewed at the time the work is scheduled to determine if an air quality permit will be required. Should any interim permits become needed, they will be closed out with documentation of compliance after decommissioning.

# 4 COST ESTIMATE

## 4.1 Estimated Cost

The estimated cost to decommission the Project and restore the Site is a surplus of $1,229,700 in present-day dollars (Appendix A). 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. Division of this estimated cost by the Project's anticipated 100 MW results in a surplus of approximately $12,297 per MW.

The salvage revenue is based upon the resale and scrap values of salvaged materials, including material salvaged from the solar panels, racking systems, and electrical equipment, rather than the sale and reuse of the equipment in other solar farm projects or other installations. The scrap market, which is impacted by macroeconomic events, is difficult to predict and will certainly influence cost estimates.

## 4.2 Financial Assurance Plan

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.

Benton Solar also will coordinate with Benton County to establish an agreed-upon timeline for establishing the financial security and updating it as needed throughout the life of the Project. For example, in year 10 of the Project's operation life, a third party may determine the exact amount to be allocated for decommissioning that will assess the difference between estimated decommissioning costs

and the salvage value. Beginning in year 11 of the Project's operational life, Benton Solar would then either create a reserve fund, enter into a surety bond agreement, create an escrow account, or provide another form of security that would ultimately fund decommissioning and Site restoration costs, to the extent that the salvage value does not cover decommissioning costs. Financial assurances, whether implemented in a step-wise manner or not, will be paid in full no later than the end of the Power Purchase Agreement.

This plan will be re-evaluated every 5 years to allow for adjustments in the amount of surety and beneficiary, as needed.

## 4.3 Assumptions

Benton Solar established the scope of work and individual tasks for this decommissioning plan using professional experience. The Project was broken into individual tasks that were each estimated separately to include labor requirements, equipment needs, and duration. Production and labor rates were established using professional experience and published standards, including RSMeans (RSMeans 2024). After the estimate was completed, typical industry-standard average markups were applied for contingency, overhead, and fees. Estimating methods and assumptions specific to this estimate are as follows:

- Labor costs were developed through rates published by RSMeans, which are based on union wages averaged for 30 U.S. cities. Rates from St. Cloud, Minnesota, were used in the cost estimate. The labor rates include overhead and profit, which is inclusive of worker's compensation and other considerations.
- Equipment rates used in the estimate were developed by reviewing rates published by RSMeans and historical vendor quotes. Rates include fuel, maintenance, and wear and tear of ground-engaging components. Rates used assume the use of rented equipment, not owned.
- Mobilization and demobilization costs are estimated to be 15.0% of the overall contractor's costs. This reflects the actual cost to mobilize equipment, facilities, and crew to the Site. This amount covers costs of temporary facilities including one office trailer, two storage units, portable toilets, first-aid supplies, and utilities. This amount does not include the front-loading of costs from other tasks.
- Work was estimated on a unit-cost basis, priced by task, which follows the progression of work from start to finish. Unit costs are developed by including the labor, equipment, and production rate required for each individual task. RSMeans and the estimator's experience were used to establish the crew, equipment, and production for each individual task.
- Erosion and sediment control along roads reflects the cost of silt fencing on the downhill side of the road adjacent to wetlands and drainage swales.
- Perimeter control pricing is based on silt fence installation around downgradient sides of the Project perimeter.
- Final restoration will include the placement of up to 6.0 inches of topsoil on all disturbed areas where necessary to achieve approximate preconstruction conditions. Topsoil will be de-compacted and tilled to a farmable condition. Areas not returned to agricultural use (if any) will be revegetated using a seed mix approved by the local soil and water conservation district or similar agency. It is assumed that 50.0% of the topsoil required for restoration is available on-site as a result of Project installation.

- Field management during construction includes costs for one superintendent, one health and safety representative, and two field engineers. These positions are critical to the safe and successful execution of work.
- A contractor's home office, project management, overhead, and fee can vary widely by contractor. As such, averages were developed for the estimate and added as a percentage of total cost. These include 5.0% for home office and project management. Contractor contingency costs are not included. Several other miscellaneous costs have been approximated, including permits, engineering, signage, fencing, traffic control, and utility disconnects. In the context of the overall estimate, these are incidental costs that are covered in the estimate markups.
- Solar module degradation is 0.50% per year, or 88.0% after 25 years. There is currently a robust market for used solar panels and pricing can be found on eBay and other sites. It is assumed that as long as the modules are producing power, they will have economic value. To avoid overestimating the used modules' value, Benton Solar used the minimum pricing of approximately $0.07 per watt based on a We Recycle Solar quote prepared on October 22, 2020. Pricing is based on delivery to their facility. For interim decommissioning, resale of used modules will be most cost effective.
- A metal recycling facility (EMR Northern Metal Recycling) is located in Becker, Minnesota, 15.0 miles from the Site. Metal salvage prices for the midwestern United States (e.g., steel, aluminum, copper) are based on May 2024 quotes from Scrap Monster (2024). Posted prices are 3 months old. These prices are based on delivery to the recycling facility with the material prepared to meet size, thickness, cleanliness, and other specifications. A reduction of 25.0% has been taken from this price to reflect the processing by the contractor to meet the specifications.
- The steel foundation posts weigh approximately 150.0 pounds each, and hauling costs are estimated at approximately $0.83 per ton per mile.
- Hauling the steel to Becker, Minnesota, would cost about $4.15 per ton.
- The steel posts and array racking are priced at $331.12 per ton based on #1 heavy melting steel, plus a 25% discount for processing.
- There is an active market for reselling and recycling electrical transformers and inverters, with several national companies specializing in recycling. However, Benton Solar has assumed that the electrical equipment will be obsolete at the time of decommissioning, so Benton Solar has based the pricing on a percentage of the weight that reflects the aluminum or copper windings that can be salvaged. Pricing was obtained from Scrap Monster (2024). Benton Solar has assumed a 25.0% recovery of the weight of the transformers and inverters for aluminum windings.
- The collection lines are priced assuming copper conductor wire for the direct current circuits, which is typical. The prices reflect a reduced yield of copper resulting from the stripping of insulation and other materials from the wire prior to recycling. The estimate uses the Midwest price of #2 insulated copper wire with a 50.0% recovery rate as found on Scrap Monster in May 2024 (but representative of 3 months prior), which is $1.29 per pound.
- All Project Facilities, including their approximate size and weight, will be disposed of as described in Section 2.4.

# 5 LITERATURE CITED

RSMeans. 2024. RS Means Data from Gordian. Available at: https://rsmeans.com. Accessed June 2023.

Scrap Monster. 2024. United States Scrap Metal Prices. Available at: https://www.scrapmonster.com/scrap-metal-prices/united-states. Accessed June 2024.

# APPENDIX A

## Decommissioning Cost Estimate, Benton Solar Project, Benton County, Minnesota

Westwood

# Decommissioning Cost Estimate

Benton Solar Project

Benton County, Minnesota

Prepared for:

Benton Solar, LLC
700 Universe Blvd.
Juno Beach, FL 33401

Prepared by:

Westwood Professional Services
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Minnetonka, MN 55343
(952) 937-5150

Project Number: 0041811.01

Date: May 31, 2024

# Benton Solar Project

| | Quantity | Unit | Unit Cost | Total Cost |
|---|---|---|---|---|
| Mobilization/Demobilization | 1 | Lump Sum | $1,575,100.00 | $1,575,100 |
| *Mobilization was estimated to be approximately 15% of total cost of other items.* | | | | |
| | | | | |
| Permitting | | | | |
| County Permits | 1 | Lump Sum | $10,000.00 | $10,000 |
| State Permits | 1 | Lump Sum | $20,000.00 | $20,000 |
| Subtotal Permitting | | | | $30,000 |
| *Decommissioning will require SWPPP and SPCC Plans. Cost is an estimate of the permit preparation cost.* | | | | |
| | | | | |
| Civil Infrastructure | | | | |
| Remove Gravel Surfacing from Road | 10,260 | Cubic Yards (BV) | $3.01 | $30,883 |
| Haul Gravel Removed from Road to Landfill (Becker, MN) | 12,825 | Cubic Yards (LV) | $14.25 | $182,732 |
| Dispose of Gravel Removed from Road (Landfill uses as Daily Cover) | 16,621 | Tons | $0.00 | $0 |
| Remove Geotextile Fabric from Beneath Access Roads | 62,410 | Square Yards | $1.40 | $87,374 |
| Haul Geotech Fabric to Landfill (Becker, MN) | 17.0 | Tons | $10.45 | $178 |
| Dispose of Geotech Fabric | 17.0 | Tons | $81.00 | $1,377 |
| Remove and Load Culvert from Beneath Access Roads | 15 | Each | $420.00 | $6,300 |
| Haul Culvert Removed from Access Roads to Landfill (Becker, MN) | 4.5 | Tons | $10.45 | $47 |
| Dispose of Culvert | 4.5 | Tons | $81.00 | $365 |
| Remove Low Water Crossing from Access Road | 9 | Each | $3,400.00 | $30,600 |
| Haul Low Water Crossing Materials to Landfill (Becker, MN) | 360.0 | Ton | $10.45 | $3,761 |
| Dispose of Low Water Crossing Materials | 360.0 | Ton | $30.00 | $10,800 |
| Grade Road Corridor (Re-spread Topsoil) | 40,836 | Linear Feet | $1.28 | $52,270 |
| Decompact Road Area | 12.9 | Acres | $222.97 | $2,876 |
| Remove Chainlink Fence (Substation, BESS, O&M, etc.) | 1,950 | Linear Feet | $7.68 | $14,976 |
| Haul Chainlink Fence to Metal Recycling (Becker, MN) | 10 | Tons | $4.95 | $49 |
| Remove Agricultural Fence | 57,537 | Linear Feet | $2.71 | $155,925 |
| Haul Agricultural Fence to Metal Recycling (Becker, MN) | 89.2 | Tons | $4.95 | $441 |
| Subtotal Civil Infrastructure | | | | $580,955 |
| *Civil removal costs are a combination of MNDOT unit costs where applicable, RSMeans cost for St. Cloud, and industry standards provided to Westwood.* | | | | |
| | | | | |
| Structural Infrastructure | | | | |
| Remove Steel Foundation Posts (Arrays) | 44,164 | Each | $16.60 | $733,122 |
| Remove Drive Motor Posts | 3,535 | Each | $16.60 | $58,681 |
| Remove Steel Foundation Posts (Equipment Skids) | 232 | Each | $16.60 | $3,851 |
| Haul Steel Post to Metal Recycling (Becker, MN) | 3,434 | Tons | $4.15 | $14,251 |
| Remove Tracker Racking per String | 10,008 | Each | $205.07 | $2,052,341 |
| Haul Tracker Racking to Metal Recycling (Becker, MN) | 7,858 | Tons | $4.15 | $32,611 |
| Haul Drive Motor Posts to Metal Recycling (Becker, MN) | 255 | Tons | $4.15 | $1,058 |
| Subtotal Structural Infrastructure | | | | $2,895,915 |
| *Steel removal costs were calculated by using RSMeans information for demolition of steel members.* | | | | |
| *Hauling calculations are based on the locations of metals recyclers.* | | | | |
| | | | | |
| Electrical Collection System | | | | |
| Remove PV Panels | 260,208 | Each | $5.67 | $1,475,379 |
| Haul PV 95% of Panels to Reseller (Louisville, KY) | 8,005 | Tons | $193.43 | $1,548,369 |
| Haul 5% of PV Panels to Landfill (Becker, MN) | 421 | Tons | $13.96 | $5,877 |
| Dispose of PV Panels | 421 | Tons | $81.00 | $34,101 |
| Remove Combiner Boxes | 29 | Each | $60.00 | $1,740 |
| Remove Equipment Skids | 29 | Each | $1,167.48 | $33,857 |
| Remove Equipment Pad Frames and Foundations | 29 | Each | $3,178.10 | $92,165 |
| Haul Equipment to Transformer Disposal (Albany, MN) | 29 | Each | $249.25 | $7,228 |
| Remove SCADA Equipment | 1 | Each | $2,000.00 | $2,000 |
| Remove DC Collector System Cables (copper) | 140 | Per MW | $2,000.00 | $280,000 |
| Remove Underground (AC) Collector System Cables | 75,288 | Linear Feet | $2.77 | $208,548 |
| Load and Haul Cables for Recycling | 1,218 | Tons | $4.15 | $5,055 |
| Subtotal Electrical Collection | | | | $3,694,319 |
| *Electrical removal costs of PV Panels and Combiner Boxes were based industry standard installation rates. Equipment pads, MV Equipment, and SCADA Equipment removal cost are based on removal of equipment, concrete pads, and conduits using a truck mounted crane and RSMeans information on crew production rates.* | | | | |

| | | | | |
|---|---|---|---|---|
| Substation | | | | |
| Disassemble and Remove Main Power Transformer(s) | 2 | Each | $4,500.00 | $9,000 |
| Haul Transformer(s) Offsite | 547 | Tons | $9.97 | $5,454 |
| Haul Transformer Oil Offsite | 25,660 | Gallons | $0.09 | $2,309 |
| Dispose of Transformer (Including Oil) (Salvage Value) | 2 | Each | $0.00 | $0 |
| Excavate Around Transformer Foundation(s) | 2 | Each | $1,920.83 | $3,842 |
| Remove Complete Transformer Foundation(s) | 167 | Cubic Yards | $163.74 | $27,345 |
| Backfill Excavation Area from Transformer Foundation Removal | 169 | Cubic Yards | $43.15 | $7,292 |
| Haul Concrete (Foundations Transformer, Switch Gear, etc.) | 339 | Tons | $24.75 | $8,389 |
| Dispose of Concrete from Transformer Foundation | 339 | Tons | $50.00 | $16,950 |
| Demolish Substation Site Improvements (fences, etc) | 1 | LS | $3,500.00 | $3,500 |
| Demolish Control Building and Foundation | 1 | LS | $12,000.00 | $12,000 |
| Remove Medium/High Voltage Equipment | 1 | LS | $3,500.00 | $3,500 |
| Remove Structural Steel Substation Frame | 1 | LS | $3,500.00 | $3,500 |
| Remove Copper Ground Grid | 1 | LS | $15,174.32 | $15,174 |
| Load Copper Wire | 20,000 | Feet | $0.92 | $18,400 |
| Haul Copper Wire to Recycling | 6.5 | Tons | $4.15 | $27 |
| Haul - Demolition Materials, Removed Equipment & Structural Steel | 20 | Tons | $4.15 | $83 |
| Dispose of Demolition Materials & Removed Equipment | 20 | Tons | $81.00 | $1,620 |
| Remove and Load Gravel Surfacing from Substation Site | 5,352 | Cubic Yards (BV) | $3.01 | $16,110 |
| Haul Gravel Removed from Substation Site | 6,690 | Cubic Yards (LV) | $14.25 | $95,320 |
| Dispose of Gravel from Substation Site (Use as Daily Cover) | 8,670 | Tons | $0.00 | $0 |
| Grade Substation Site | 216,776 | SF | $0.07 | $15,174 |
| Erosion and Sediment Control at Substation Site | 975 | LF | $3.86 | $3,764 |
| Decompact Substation Site (Subsoiling) | 5.0 | Acres | $222.97 | $1,115 |
| Permanent Seeding at Substation Site | 5.0 | Acres | $4,259.20 | $21,296 |
| Subtotal Substation | | | | $291,163 |

| | | | | |
|---|---|---|---|---|
| Battery Energy Storage System (BESS) | | | | |
| Train Crew in Safety and Hazmat | 1 | LS | $5,000.00 | $5,000 |
| Disconnect Battery Storage Containers | 156 | Each | $1,530.40 | $238,742 |
| Remove and Pack Batteries from Containers for Recycling | 156 | Each | $2,334.96 | $364,254 |
| Haul Batteries to Recycling Facility - Included in Recycling Fee | 3,020 | Tons | $0.00 | $0 |
| Recycle Li-Ion Batteries (Includes Hauling) | 6,040,320 | lbs | $0.30 | $1,812,096 |
| Haul Storage Containers to Metal Recycler (Becker, MN) | 824 | Tons | $4.15 | $3,420 |
| Remove HVAC system/Auxiliary Equipment | 156 | Each | $191.30 | $29,843 |
| Haul Auxiliary Equipment/Racking to Metal Recycler (Becker, MN) | 1,373 | Tons | $4.15 | $5,698 |
| Remove Equipment Skids | 39 | Each | $1,167.48 | $45,532 |
| Haul Inverters/Transformers to Transformer Disposal | 39 | Each | $203.68 | $7,944 |
| Remove Steel Foundation Posts (Storage Containers and Skids) | 1,560 | Each | $16.60 | $25,896 |
| Haul Steel Posts to Metal Recycler (Becker, MN) | 112 | Tons | $4.15 | $465 |
| Removal of DC Collector System Cables (copper) | 6,240 | LF | $2.57 | $16,037 |
| Removal of Underground AC Collector Cables (aluminum) | 5,395 | LF | $2.57 | $13,865 |
| Load and Haul Cables for Recycling | 207 | Tons | $4.77 | $987 |
| Remove and Load Gravel Surfacing from BESS Site (Including Roads) | 4,707 | Cubic Yard (BV) | $3.01 | $14,168 |
| Haul Gravel Removed from BESS Site | 5,884 | Cubic Yard (LV) | $14.25 | $83,836 |
| Dispose of Gravel from BESS Site (Use as Daily Cover) | 7,626 | Tons | $0.00 | $0 |
| Stabilized Construction Entrance | 1 | Each | $2,000.00 | $2,000 |
| Erosion and Sediment Controls at BESS Site | 925 | LF | $3.86 | $3,571 |
| Decompact BESS Site | 4.4 | Acres | $222.97 | $981 |
| Grade BESS Site | 190,650 | SF | $0.07 | $13,346 |
| Permanent Seeding at BESS Site | 4.4 | Acres | $4,259.20 | $18,740 |
| Till to Permanent Condition | 4.4 | Acres | $177.52 | $781 |
| Subtotal BESS | | | | $2,707,200 |

O&M Building - Assumed to be off-site and not included in project decommissioning.

| | | | | |
|---|---|---|---|---|
| Site Restoration | | | | |
| Stabilized Construction Entrance | 13 | Each | $2,000.00 | $26,000 |
| Perimeter Controls (Erosion and Sediment Control) | 44,326 | Linear Feet | $3.86 | $171,098 |
| Permanent Seeding on Roadway Areas (est. 50% previously not ag) | 6.5 | Acres | $4,259.20 | $27,472 |
| Till to Farmable Condition on Array Areas | 599 | Acres | $177.52 | $106,317 |
| Subtotal Site Restoration | | | | $330,887 |

| | | | | |
|---|---|---|---|---|
| Project Management | | | | |
| Project Manager | 40 | Weeks | $3,749.00 | $149,960 |
| Superintendent (full-time) | 40 | Weeks | $3,525.00 | $141,000 |
| Field Engineer 2x (full-time) | 40 | Weeks | $6,538.00 | $261,520 |
| Subtotal Project Management | | | | $552,480 |
| *Standard industry weekly rates from RSMeans.* | | | | |
| | | | | |
| Home Office and Project Management | 5% | | | $552,646 |
| | | | | |
| Subtotal Demolition/Removals | | | | $13,210,665 |
| | | | | |
| Salvage | | | | |
| Fencing (Wire/Agricultural) | 89 | Tons | $248.34 | $22,102 |
| Fencing (Chain Link) | 10 | Tons | $248.34 | $2,483 |
| Steel Posts | 3,434 | Tons | $248.34 | $852,800 |
| Module Racking | 7,858 | Tons | $248.34 | $1,951,456 |
| PV Modules | 247,198 | Each | $36.51 | $9,025,996 |
| Transformers and Inverters | 194,423 | Pounds | $0.27 | $52,494 |
| Substation Transformers (Core and Coils) | 654,323 | Pounds | $0.27 | $176,667 |
| Substation Transformers (Tanks and Fittings) | 220 | Tons | $248.34 | $54,635 |
| Transformers (Oil) | 47,700 | Gallons | $0.70 | $33,390 |
| Substation Ground Grid (Copper) | 13,000 | Pounds | $2.73 | $35,490 |
| DC Collection Lines (Copper) | 1,871,057 | Pounds | $0.97 | $1,814,925 |
| AC Collection Lines (Aluminum) | 564,656 | Pounds | $0.74 | $417,845 |
| Subtotal Salvage | | | | $14,440,284 |
| *Salvage values are a combination of the following factors; current market metal salvage prices, current secondary market for solar panel* | | | | |
| | | | | |
| Total Demolition Minus Salvage | | | | ($1,229,700) |

Notes:
1. Prices used in analysis are estimated based on research of current average costs and salvage values.
2. Prices provided are estimates and may fluctuate over the life of the project.
3. Contractor means and methods may vary and price will be affected by these.

# APPENDIX F

## Residences within 1.0 Mile of the Site

**Table F-1. Residences within 1.0 Mile of the Site**

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 1 | 0.01 | 0.06 |
| 2 | 0.03 | 0.06 |
| 3 | 0.05 | 0.06 |
| 4 | 0.03 | 0.06 |
| 5 | 0.02 | 0.06 |
| 6 | 0.03 | 0.06 |
| 7 | 0.04 | 0.06 |
| 8 | 0.03 | 0.07 |
| 9 | 0.04 | 0.07 |
| 10 | 0.02 | 0.07 |
| 11 | 0.02 | 0.07 |
| 12 | 0.02 | 0.07 |
| 13 | 0.05 | 0.08 |
| 14 | 0.05 | 0.08 |
| 15 | 0.05 | 0.09 |
| 16 | 0.07 | 0.09 |
| 17 | 0.07 | 0.09 |
| 18 | 0.04 | 0.09 |
| 19 | 0.05 | 0.09 |
| 20 | 0.01 | 0.10 |
| 21 | 0.03 | 0.10 |
| 22 | 0.05 | 0.10 |
| 23 | 0.05 | 0.11 |
| 24 | 0.05 | 0.11 |
| 25 | 0.09 | 0.12 |
| 26 | 0.09 | 0.12 |
| 27 | 0.12 | 0.13 |
| 28 | 0.11 | 0.13 |
| 29 | 0.08 | 0.13 |
| 30 | 0.11 | 0.14 |
| 31 | 0.07 | 0.14 |
| 32 | 0.07 | 0.15 |
| 33 | 0.08 | 0.15 |
| 34 | 0.14 | 0.16 |
| 35 | 0.13 | 0.16 |
| 36 | 0.13 | 0.17 |
| 37 | 0.13 | 0.17 |
| 38 | 0.03 | 0.17 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 39 | 0.15 | 0.18 |
| 40 | 0.12 | 0.18 |
| 41 | 0.14 | 0.18 |
| 42 | 0.03 | 0.18 |
| 43 | 0.15 | 0.18 |
| 44 | 0.08 | 0.18 |
| 45 | 0.16 | 0.18 |
| 46 | 0.18 | 0.19 |
| 47 | 0.16 | 0.19 |
| 48 | 0.14 | 0.20 |
| 49 | 0.18 | 0.20 |
| 50 | 0.16 | 0.20 |
| 51 | 0.10 | 0.20 |
| 52 | 0.19 | 0.21 |
| 53 | 0.20 | 0.23 |
| 54 | 0.09 | 0.23 |
| 55 | 0.21 | 0.23 |
| 56 | 0.21 | 0.23 |
| 57 | 0.22 | 0.23 |
| 58 | 0.13 | 0.23 |
| 59 | 0.13 | 0.23 |
| 60 | 0.19 | 0.23 |
| 61 | 0.13 | 0.24 |
| 62 | 0.22 | 0.25 |
| 63 | 0.23 | 0.25 |
| 64 | 0.18 | 0.25 |
| 65 | 0.24 | 0.25 |
| 66 | 0.24 | 0.26 |
| 67 | 0.17 | 0.26 |
| 68 | 0.24 | 0.27 |
| 69 | 0.25 | 0.27 |
| 70 | 0.23 | 0.27 |
| 71 | 0.22 | 0.28 |
| 72 | 0.21 | 0.28 |
| 73 | 0.26 | 0.28 |
| 74 | 0.27 | 0.28 |
| 75 | 0.27 | 0.29 |
| 76 | 0.23 | 0.29 |
| 77 | 0.18 | 0.29 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 78 | 0.26 | 0.30 |
| 79 | 0.29 | 0.30 |
| 80 | 0.29 | 0.30 |
| 81 | 0.29 | 0.31 |
| 82 | 0.29 | 0.31 |
| 83 | 0.29 | 0.31 |
| 84 | 0.29 | 0.31 |
| 85 | 0.21 | 0.31 |
| 86 | 0.29 | 0.31 |
| 87 | 0.24 | 0.31 |
| 88 | 0.31 | 0.32 |
| 89 | 0.30 | 0.32 |
| 90 | 0.27 | 0.32 |
| 91 | 0.30 | 0.33 |
| 92 | 0.31 | 0.33 |
| 93 | 0.31 | 0.33 |
| 94 | 0.18 | 0.34 |
| 95 | 0.33 | 0.35 |
| 96 | 0.35 | 0.36 |
| 97 | 0.34 | 0.36 |
| 98 | 0.30 | 0.37 |
| 99 | 0.34 | 0.37 |
| 100 | 0.35 | 0.37 |
| 101 | 0.35 | 0.37 |
| 102 | 0.36 | 0.38 |
| 103 | 0.25 | 0.38 |
| 104 | 0.36 | 0.38 |
| 105 | 0.29 | 0.38 |
| 106 | 0.37 | 0.40 |
| 107 | 0.39 | 0.40 |
| 108 | 0.39 | 0.41 |
| 109 | 0.39 | 0.41 |
| 110 | 0.40 | 0.42 |
| 111 | 0.34 | 0.42 |
| 112 | 0.24 | 0.43 |
| 113 | 0.42 | 0.43 |
| 114 | 0.42 | 0.43 |
| 115 | 0.42 | 0.44 |
| 116 | 0.40 | 0.44 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 117 | 0.22 | 0.44 |
| 118 | 0.42 | 0.44 |
| 119 | 0.42 | 0.45 |
| 120 | 0.43 | 0.45 |
| 121 | 0.43 | 0.45 |
| 122 | 0.43 | 0.45 |
| 123 | 0.29 | 0.46 |
| 124 | 0.44 | 0.47 |
| 125 | 0.45 | 0.47 |
| 126 | 0.30 | 0.48 |
| 127 | 0.47 | 0.48 |
| 128 | 0.46 | 0.49 |
| 129 | 0.46 | 0.49 |
| 130 | 0.48 | 0.49 |
| 131 | 0.47 | 0.50 |
| 132 | 0.48 | 0.50 |
| 133 | 0.46 | 0.50 |
| 134 | 0.48 | 0.50 |
| 135 | 0.49 | 0.52 |
| 136 | 0.37 | 0.52 |
| 137 | 0.49 | 0.52 |
| 138 | 0.50 | 0.52 |
| 139 | 0.39 | 0.52 |
| 140 | 0.50 | 0.53 |
| 141 | 0.48 | 0.53 |
| 142 | 0.52 | 0.54 |
| 143 | 0.49 | 0.54 |
| 144 | 0.53 | 0.55 |
| 145 | 0.53 | 0.56 |
| 146 | 0.53 | 0.56 |
| 147 | 0.52 | 0.56 |
| 148 | 0.46 | 0.57 |
| 149 | 0.55 | 0.58 |
| 150 | 0.56 | 0.58 |
| 151 | 0.56 | 0.58 |
| 152 | 0.57 | 0.59 |
| 153 | 0.39 | 0.60 |
| 154 | 0.58 | 0.60 |
| 155 | 0.58 | 0.61 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 156 | 0.58 | 0.61 |
| 157 | 0.59 | 0.61 |
| 158 | 0.60 | 0.62 |
| 159 | 0.60 | 0.63 |
| 160 | 0.59 | 0.63 |
| 161 | 0.62 | 0.63 |
| 162 | 0.63 | 0.64 |
| 163 | 0.51 | 0.64 |
| 164 | 0.62 | 0.64 |
| 165 | 0.61 | 0.65 |
| 166 | 0.56 | 0.65 |
| 167 | 0.64 | 0.66 |
| 168 | 0.64 | 0.67 |
| 169 | 0.65 | 0.68 |
| 170 | 0.64 | 0.69 |
| 171 | 0.65 | 0.69 |
| 172 | 0.68 | 0.70 |
| 173 | 0.68 | 0.71 |
| 174 | 0.46 | 0.73 |
| 175 | 0.48 | 0.73 |
| 176 | 0.71 | 0.73 |
| 177 | 0.71 | 0.74 |
| 178 | 0.58 | 0.74 |
| 179 | 0.75 | 0.77 |
| 180 | 0.74 | 0.77 |
| 181 | 0.77 | 0.78 |
| 182 | 0.77 | 0.79 |
| 183 | 0.77 | 0.79 |
| 184 | 0.66 | 0.82 |
| 185 | 0.81 | 0.84 |
| 186 | 0.83 | 0.85 |
| 187 | 0.83 | 0.86 |
| 188 | 0.84 | 0.87 |
| 189 | 0.86 | 0.89 |
| 190 | 0.86 | 0.89 |
| 191 | 0.88 | 0.92 |
| 192 | 0.68 | 0.94 |
| 193 | 0.93 | 0.94 |
| 194 | 0.69 | 0.95 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 195 | 0.92 | 0.95 |
| 196 | 0.78 | 0.96 |
| 197 | 0.71 | 0.96 |
| 198 | 0.92 | 0.96 |
| 199 | 0.81 | 0.96 |
| 200 | 0.93 | 0.97 |
| 201 | 0.92 | 0.98 |
| 202 | 0.71 | 0.99 |
| 203 | 0.87 | 0.99 |
| 204 | 0.82 | 0.99 |
| 205 | 0.97 | 0.99 |
| 206 | 0.97 | 1.00 |
| 207 | 0.97 | 1.00 |
| 208 | 0.96 | 1.00 |
| 209 | 0.96 | 1.00 |
| 210 | 0.98 | 1.01 |
| 211 | 0.90 | 1.01 |
| 212 | 0.99 | 1.01 |
| 213 | 0.84 | 1.01 |
| 214 | 0.99 | 1.02 |
| 215 | 0.83 | 1.04 |
| 216 | 0.88 | 1.04 |
| 217 | 0.83 | 1.06 |
| 218 | 0.86 | 1.07 |
| 219 | 0.86 | 1.07 |
| 220 | 0.87 | 1.07 |
| 221 | 0.88 | 1.07 |
| 222 | 0.87 | 1.07 |
| 223 | 0.88 | 1.07 |
| 224 | 0.86 | 1.07 |
| 225 | 0.88 | 1.07 |
| 226 | 0.86 | 1.07 |
| 227 | 0.85 | 1.07 |
| 228 | 0.85 | 1.07 |
| 229 | 0.84 | 1.07 |
| 230 | 0.85 | 1.07 |
| 231 | 0.85 | 1.07 |
| 232 | 0.83 | 1.08 |
| 233 | 0.89 | 1.08 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 234 | 0.95 | 1.08 |
| 235 | 0.87 | 1.08 |
| 236 | 0.90 | 1.08 |
| 237 | 0.91 | 1.09 |
| 238 | 0.92 | 1.09 |
| 239 | 0.84 | 1.10 |
| 240 | 0.92 | 1.10 |
| 241 | 0.90 | 1.10 |
| 242 | 0.90 | 1.10 |
| 243 | 0.89 | 1.10 |
| 244 | 0.90 | 1.10 |
| 245 | 0.89 | 1.10 |
| 246 | 0.89 | 1.10 |
| 247 | 0.91 | 1.10 |
| 248 | 0.89 | 1.10 |
| 249 | 0.91 | 1.10 |
| 250 | 0.89 | 1.11 |
| 251 | 0.88 | 1.11 |
| 252 | 0.87 | 1.11 |
| 253 | 0.88 | 1.11 |
| 254 | 0.95 | 1.11 |
| 255 | 0.88 | 1.11 |
| 256 | 0.89 | 1.11 |
| 257 | 0.92 | 1.11 |
| 258 | 0.88 | 1.11 |
| 259 | 0.93 | 1.12 |
| 260 | 0.94 | 1.12 |
| 261 | 0.96 | 1.13 |
| 262 | 0.95 | 1.13 |
| 263 | 0.85 | 1.13 |
| 264 | 0.96 | 1.15 |
| 265 | 0.97 | 1.15 |
| 266 | 0.99 | 1.17 |
| 267 | 0.96 | 1.17 |
| 268 | 0.98 | 1.20 |
| 269 | 0.94 | 1.21 |
| 270 | 0.94 | 1.22 |
| 271 | 0.94 | 1.22 |
| 272 | 0.94 | 1.22 |

| Residence ID | Distance to Site (miles) | Distance to Solar Arrays (miles) |
|---|---|---|
| 273 | 0.94 | 1.22 |
| 274 | 0.94 | 1.22 |
| 275 | 0.94 | 1.22 |
| 276 | 0.94 | 1.22 |
| 277 | 0.98 | 1.22 |
| 278 | 0.95 | 1.23 |
| 279 | 0.96 | 1.23 |
| 280 | 0.98 | 1.24 |
| 281 | 0.97 | 1.24 |
| 282 | 0.97 | 1.24 |
| 283 | 0.97 | 1.25 |
| 284 | 0.98 | 1.25 |
| 285 | 0.98 | 1.25 |
| 286 | 0.98 | 1.26 |
| 287 | 0.98 | 1.26 |

Note: This table is intended to show the approximate distances of all residences within 1.0 mile of the Site to both the Site and nearest solar array. Residence ID numbers illustrate the total number of residences and are not keyed to any variable.

# APPENDIX G

## Project and Ambient Sound Levels at Select Receptors

**Table G-1. Project and Ambient Sound Levels at Select Receptors.**

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 1 | 418852.15 | 5044858.46 | 21 | 34 | 40 | 45 | 50 |
| 2 | 419252.84 | 5044876.99 | 21 | 34 | 40 | 45 | 50 |
| 3 | 419214.91 | 5044936.15 | 21 | 34 | 40 | 45 | 50 |
| 4 | 418096.64 | 5044952.12 | 22 | 34 | 40 | 45 | 50 |
| 5 | 419002.24 | 5044952.77 | 19 | 34 | 40 | 45 | 50 |
| 6 | 419113.31 | 5044952.37 | 20 | 34 | 40 | 45 | 50 |
| 7 | 418874.39 | 5044986.38 | 19 | 34 | 40 | 45 | 50 |
| 8 | 419178.65 | 5045000.71 | 21 | 34 | 40 | 45 | 50 |
| 9 | 421362.52 | 5045028.63 | 20 | 34 | 40 | 45 | 50 |
| 10 | 421642.99 | 5045029.51 | 18 | 34 | 40 | 45 | 50 |
| 11 | 418389.74 | 5045087.61 | 23 | 34 | 40 | 45 | 50 |
| 12 | 418240.34 | 5045087.32 | 22 | 34 | 40 | 45 | 50 |
| 13 | 418851.48 | 5045091.35 | 21 | 34 | 40 | 45 | 50 |
| 14 | 418716.61 | 5045089.30 | 21 | 34 | 40 | 45 | 50 |
| 15 | 419032.97 | 5045086.93 | 19 | 34 | 40 | 45 | 50 |
| 16 | 421546.45 | 5045082.24 | 18 | 34 | 40 | 45 | 50 |
| 17 | 419056.43 | 5045134.52 | 22 | 34 | 40 | 45 | 50 |
| 18 | 418913.15 | 5045200.37 | 22 | 34 | 40 | 45 | 50 |
| 19 | 418742.17 | 5045208.11 | 21 | 34 | 40 | 45 | 50 |
| 20 | 418596.56 | 5045217.91 | 21 | 34 | 40 | 45 | 50 |
| 21 | 419158.19 | 5045216.08 | 21 | 34 | 40 | 45 | 50 |
| 22 | 418241.71 | 5045236.46 | 22 | 34 | 40 | 45 | 50 |
| 23 | 418438.64 | 5045232.79 | 24 | 34 | 40 | 45 | 50 |
| 24 | 418327.37 | 5045243.27 | 22 | 34 | 40 | 45 | 50 |
| 25 | 418954.81 | 5045237.43 | 22 | 34 | 40 | 45 | 50 |
| 26 | 419024.14 | 5045253.65 | 22 | 34 | 40 | 45 | 50 |
| 27 | 417945.59 | 5045270.03 | 21 | 34 | 40 | 45 | 50 |
| 28 | 421614.29 | 5045235.77 | 18 | 34 | 40 | 45 | 50 |
| 29 | 418521.62 | 5045278.18 | 21 | 34 | 40 | 45 | 50 |
| 30 | 419162.11 | 5045273.67 | 21 | 34 | 40 | 45 | 50 |
| 31 | 418631.56 | 5045311.12 | 21 | 34 | 40 | 45 | 50 |
| 32 | 418910.38 | 5045315.03 | 21 | 34 | 40 | 45 | 50 |
| 33 | 418758.21 | 5045327.17 | 21 | 34 | 40 | 45 | 50 |
| 34 | 419169.59 | 5045339.76 | 22 | 34 | 40 | 45 | 50 |
| 35 | 419172.23 | 5045389.18 | 21 | 34 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 36 | 418669.45 | 5045426.62 | 20 | 34 | 40 | 45 | 50 |
| 37 | 419021.27 | 5045426.63 | 21 | 34 | 40 | 45 | 50 |
| 38 | 419144.91 | 5045437.79 | 21 | 34 | 40 | 45 | 50 |
| 39 | 418540.33 | 5045443.96 | 20 | 34 | 40 | 45 | 50 |
| 40 | 418847.25 | 5045459.26 | 20 | 34 | 40 | 45 | 50 |
| 41 | 417827.09 | 5045496.44 | 19 | 34 | 40 | 45 | 50 |
| 42 | 420934.53 | 5045466.73 | 22 | 34 | 40 | 45 | 50 |
| 43 | 419589.77 | 5045477.83 | 23 | 34 | 40 | 45 | 50 |
| 44 | 421496.53 | 5045461.51 | 19 | 34 | 40 | 45 | 50 |
| 45 | 418772.29 | 5045494.25 | 20 | 34 | 40 | 45 | 50 |
| 46 | 418518.06 | 5045549.39 | 26 | 35 | 40 | 45 | 50 |
| 47 | 419193.19 | 5045547.32 | 21 | 34 | 40 | 45 | 50 |
| 48 | 418635.45 | 5045557.29 | 26 | 35 | 40 | 45 | 50 |
| 49 | 418864.60 | 5045566.30 | 22 | 34 | 40 | 45 | 50 |
| 50 | 418746.40 | 5045576.90 | 26 | 35 | 40 | 45 | 50 |
| 51 | 417900.74 | 5045590.20 | 20 | 34 | 40 | 45 | 50 |
| 52 | 420126.91 | 5045616.14 | 24 | 34 | 40 | 45 | 50 |
| 53 | 418070.75 | 5045645.55 | 21 | 34 | 40 | 45 | 50 |
| 54 | 418086.63 | 5045646.12 | 21 | 34 | 40 | 45 | 50 |
| 55 | 418621.42 | 5045650.56 | 26 | 35 | 40 | 45 | 50 |
| 56 | 418702.88 | 5045653.94 | 26 | 35 | 40 | 45 | 50 |
| 57 | 418829.29 | 5045652.52 | 25 | 34 | 40 | 45 | 50 |
| 58 | 418873.81 | 5045654.49 | 22 | 34 | 40 | 45 | 50 |
| 59 | 417818.06 | 5045673.93 | 25 | 35 | 40 | 45 | 50 |
| 60 | 418464.44 | 5045675.34 | 26 | 35 | 40 | 45 | 50 |
| 61 | 417819.66 | 5045691.70 | 25 | 35 | 40 | 45 | 50 |
| 62 | 418495.75 | 5045678.96 | 26 | 35 | 40 | 45 | 50 |
| 63 | 418525.11 | 5045686.98 | 26 | 35 | 40 | 45 | 50 |
| 64 | 418555.90 | 5045699.33 | 26 | 35 | 40 | 45 | 50 |
| 65 | 418956.19 | 5045699.53 | 21 | 34 | 40 | 45 | 50 |
| 66 | 418677.09 | 5045711.08 | 26 | 35 | 40 | 45 | 50 |
| 67 | 418707.81 | 5045712.65 | 26 | 35 | 40 | 45 | 50 |
| 68 | 418800.23 | 5045712.10 | 26 | 35 | 40 | 45 | 50 |
| 69 | 418585.77 | 5045711.28 | 26 | 35 | 40 | 45 | 50 |
| 70 | 418769.43 | 5045713.65 | 26 | 35 | 40 | 45 | 50 |
| 71 | 418647.52 | 5045719.26 | 27 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 72 | 418616.71 | 5045716.49 | 27 | 35 | 40 | 45 | 50 |
| 73 | 418739.11 | 5045713.59 | 23 | 34 | 40 | 45 | 50 |
| 74 | 420410.43 | 5045869.79 | 24 | 34 | 40 | 45 | 50 |
| 75 | 418133.57 | 5045893.75 | 27 | 35 | 40 | 45 | 50 |
| 76 | 418119.54 | 5045900.31 | 27 | 35 | 40 | 45 | 50 |
| 77 | 418106.41 | 5045901.95 | 27 | 35 | 40 | 45 | 50 |
| 78 | 418059.93 | 5045908.41 | 27 | 35 | 40 | 45 | 50 |
| 79 | 417874.43 | 5045913.24 | 27 | 35 | 40 | 45 | 50 |
| 80 | 418015.04 | 5045916.20 | 27 | 35 | 40 | 45 | 50 |
| 81 | 417999.99 | 5045918.42 | 27 | 35 | 40 | 45 | 50 |
| 82 | 417969.86 | 5045922.50 | 27 | 35 | 40 | 45 | 50 |
| 83 | 417939.86 | 5045925.66 | 27 | 35 | 40 | 45 | 50 |
| 84 | 417923.15 | 5045926.78 | 27 | 35 | 40 | 45 | 50 |
| 85 | 418105.15 | 5045956.57 | 28 | 35 | 40 | 45 | 50 |
| 86 | 418121.71 | 5045955.85 | 28 | 35 | 40 | 45 | 50 |
| 87 | 417830.48 | 5045959.09 | 27 | 35 | 40 | 45 | 50 |
| 88 | 417846.68 | 5045961.18 | 27 | 35 | 40 | 45 | 50 |
| 89 | 417860.40 | 5045967.12 | 27 | 35 | 40 | 45 | 50 |
| 90 | 417875.37 | 5045972.35 | 27 | 35 | 40 | 45 | 50 |
| 91 | 417999.98 | 5045974.73 | 28 | 35 | 40 | 45 | 50 |
| 92 | 417889.69 | 5045978.23 | 27 | 35 | 40 | 45 | 50 |
| 93 | 417903.22 | 5045986.15 | 28 | 35 | 40 | 45 | 50 |
| 94 | 421336.86 | 5046184.53 | 25 | 34 | 40 | 45 | 50 |
| 95 | 417348.89 | 5046392.31 | 28 | 35 | 40 | 45 | 50 |
| 96 | 417965.29 | 5046383.84 | 29 | 35 | 40 | 45 | 50 |
| 97 | 421359.23 | 5046415.22 | 26 | 35 | 40 | 45 | 50 |
| 98 | 416258.13 | 5046507.29 | 25 | 35 | 40 | 45 | 50 |
| 99 | 421245.09 | 5046439.06 | 26 | 35 | 40 | 45 | 50 |
| 100 | 416741.56 | 5046507.94 | 27 | 35 | 40 | 45 | 50 |
| 101 | 416288.28 | 5046511.88 | 25 | 35 | 40 | 45 | 50 |
| 102 | 416241.84 | 5046526.27 | 25 | 35 | 40 | 45 | 50 |
| 103 | 416549.53 | 5046525.90 | 26 | 35 | 40 | 45 | 50 |
| 104 | 418426.43 | 5046506.85 | 27 | 35 | 40 | 45 | 50 |
| 105 | 418303.23 | 5046506.38 | 30 | 35 | 40 | 45 | 50 |
| 106 | 416815.96 | 5046527.20 | 27 | 35 | 40 | 45 | 50 |
| 107 | 416305.14 | 5046535.61 | 25 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 108 | 420763.76 | 5046496.91 | 27 | 35 | 40 | 45 | 50 |
| 109 | 416295.54 | 5046562.40 | 25 | 35 | 40 | 45 | 50 |
| 110 | 416152.63 | 5046571.16 | 25 | 35 | 40 | 45 | 50 |
| 111 | 416176.74 | 5046569.61 | 25 | 35 | 40 | 45 | 50 |
| 112 | 416085.14 | 5046578.86 | 25 | 34 | 40 | 45 | 50 |
| 113 | 416425.19 | 5046581.15 | 26 | 35 | 40 | 45 | 50 |
| 114 | 421355.32 | 5046513.41 | 27 | 35 | 40 | 45 | 50 |
| 115 | 416300.92 | 5046586.33 | 26 | 35 | 40 | 45 | 50 |
| 116 | 416655.25 | 5046622.19 | 27 | 35 | 40 | 45 | 50 |
| 117 | 416306.58 | 5046633.25 | 26 | 35 | 40 | 45 | 50 |
| 118 | 416199.21 | 5046655.40 | 25 | 35 | 40 | 45 | 50 |
| 119 | 416487.01 | 5046686.04 | 27 | 35 | 40 | 45 | 50 |
| 120 | 416336.27 | 5046691.73 | 26 | 35 | 40 | 45 | 50 |
| 121 | 416514.36 | 5046692.19 | 27 | 35 | 40 | 45 | 50 |
| 122 | 416189.62 | 5046704.38 | 25 | 35 | 40 | 45 | 50 |
| 123 | 416531.92 | 5046714.63 | 27 | 35 | 40 | 45 | 50 |
| 124 | 416198.61 | 5046730.83 | 26 | 35 | 40 | 45 | 50 |
| 125 | 418235.58 | 5046712.33 | 31 | 36 | 41 | 45 | 50 |
| 126 | 416438.81 | 5046739.51 | 27 | 35 | 40 | 45 | 50 |
| 127 | 416537.22 | 5046744.26 | 27 | 35 | 40 | 45 | 50 |
| 128 | 416317.49 | 5046763.86 | 26 | 35 | 40 | 45 | 50 |
| 129 | 421338.62 | 5046701.77 | 28 | 35 | 40 | 45 | 50 |
| 130 | 416435.19 | 5046788.00 | 27 | 35 | 40 | 45 | 50 |
| 131 | 416410.27 | 5046788.37 | 27 | 35 | 40 | 45 | 50 |
| 132 | 420156.91 | 5046751.20 | 31 | 36 | 40 | 45 | 50 |
| 133 | 421532.84 | 5046801.31 | 28 | 35 | 40 | 45 | 50 |
| 134 | 420321.37 | 5046858.12 | 33 | 36 | 41 | 45 | 50 |
| 135 | 416486.36 | 5046932.55 | 27 | 35 | 40 | 45 | 50 |
| 136 | 418230.83 | 5046914.08 | 33 | 36 | 41 | 45 | 50 |
| 137 | 417517.64 | 5046951.79 | 31 | 36 | 41 | 45 | 50 |
| 138 | 416530.10 | 5047020.83 | 28 | 35 | 40 | 45 | 50 |
| 139 | 416337.98 | 5047029.50 | 27 | 35 | 40 | 45 | 50 |
| 140 | 418224.57 | 5047064.31 | 34 | 37 | 41 | 45 | 50 |
| 141 | 421352.94 | 5047077.17 | 32 | 36 | 41 | 45 | 50 |
| 142 | 416385.33 | 5047155.39 | 28 | 35 | 40 | 45 | 50 |
| 143 | 418219.42 | 5047172.14 | 36 | 38 | 41 | 46 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 144 | 418222.29 | 5047213.69 | 37 | 39 | 42 | 46 | 50 |
| 145 | 416744.30 | 5047240.39 | 30 | 35 | 40 | 45 | 50 |
| 146 | 418220.36 | 5047280.70 | 38 | 40 | 42 | 46 | 50 |
| 147 | 416653.69 | 5047328.97 | 29 | 35 | 40 | 45 | 50 |
| 148 | 421486.32 | 5047325.46 | 32 | 36 | 41 | 45 | 50 |
| 149 | 418229.63 | 5047392.39 | 40 | 41 | 43 | 46 | 50 |
| 150 | 416410.08 | 5047490.59 | 29 | 35 | 40 | 45 | 50 |
| 151 | 416450.23 | 5047509.46 | 29 | 35 | 40 | 45 | 50 |
| 152 | 421764.67 | 5047453.96 | 28 | 35 | 40 | 45 | 50 |
| 153 | 416402.14 | 5047535.67 | 29 | 35 | 40 | 45 | 50 |
| 154 | 416483.76 | 5047572.52 | 29 | 35 | 40 | 45 | 50 |
| 155 | 421114.32 | 5047561.78 | 39 | 40 | 42 | 46 | 50 |
| 156 | 421365.17 | 5047620.24 | 35 | 37 | 41 | 45 | 50 |
| 157 | 418125.83 | 5047679.15 | 43 | 43 | 44 | 47 | 51 |
| 158 | 418125.30 | 5047733.11 | 43 | 44 | 45 | 47 | 51 |
| 159 | 416492.24 | 5047870.37 | 29 | 35 | 40 | 45 | 50 |
| 160 | 416537.14 | 5047874.48 | 30 | 35 | 40 | 45 | 50 |
| 161 | 416605.64 | 5047888.69 | 30 | 35 | 40 | 45 | 50 |
| 162 | 416490.79 | 5047913.73 | 29 | 35 | 40 | 45 | 50 |
| 163 | 416536.15 | 5047915.74 | 30 | 35 | 40 | 45 | 50 |
| 164 | 419742.83 | 5047925.88 | 38 | 40 | 42 | 46 | 50 |
| 165 | 419835.25 | 5047984.98 | 40 | 41 | 43 | 46 | 50 |
| 166 | 416776.45 | 5048024.50 | 31 | 36 | 41 | 45 | 50 |
| 167 | 421780.77 | 5047983.76 | 27 | 35 | 40 | 45 | 50 |
| 168 | 421891.12 | 5047989.52 | 26 | 35 | 40 | 45 | 50 |
| 169 | 416551.54 | 5048068.39 | 30 | 35 | 40 | 45 | 50 |
| 170 | 419758.45 | 5048043.20 | 39 | 40 | 42 | 46 | 50 |
| 171 | 419733.34 | 5048121.10 | 38 | 40 | 42 | 46 | 50 |
| 172 | 415851.36 | 5048182.40 | 25 | 34 | 40 | 45 | 50 |
| 173 | 415900.11 | 5048184.90 | 26 | 35 | 40 | 45 | 50 |
| 174 | 420811.45 | 5048123.23 | 33 | 36 | 41 | 45 | 50 |
| 175 | 415960.85 | 5048198.57 | 27 | 35 | 40 | 45 | 50 |
| 176 | 416029.87 | 5048218.33 | 27 | 35 | 40 | 45 | 50 |
| 177 | 415851.62 | 5048253.27 | 25 | 35 | 40 | 45 | 50 |
| 178 | 416186.10 | 5048245.53 | 28 | 35 | 40 | 45 | 50 |
| 179 | 416101.30 | 5048243.99 | 28 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 180 | 420574.41 | 5048191.82 | 35 | 38 | 41 | 45 | 50 |
| 181 | 416245.10 | 5048251.61 | 28 | 35 | 40 | 45 | 50 |
| 182 | 415788.90 | 5048253.34 | 25 | 35 | 40 | 45 | 50 |
| 183 | 415899.20 | 5048259.85 | 25 | 35 | 40 | 45 | 50 |
| 184 | 420672.25 | 5048203.47 | 33 | 37 | 41 | 45 | 50 |
| 185 | 421111.77 | 5048199.38 | 33 | 36 | 41 | 45 | 50 |
| 186 | 416273.16 | 5048266.77 | 29 | 35 | 40 | 45 | 50 |
| 187 | 415953.48 | 5048277.35 | 27 | 35 | 40 | 45 | 50 |
| 188 | 416314.01 | 5048274.04 | 29 | 35 | 40 | 45 | 50 |
| 189 | 416036.55 | 5048286.52 | 27 | 35 | 40 | 45 | 50 |
| 190 | 416391.73 | 5048294.23 | 29 | 35 | 40 | 45 | 50 |
| 191 | 416423.46 | 5048297.75 | 29 | 35 | 40 | 45 | 50 |
| 192 | 416105.10 | 5048302.83 | 28 | 35 | 40 | 45 | 50 |
| 193 | 415772.69 | 5048311.55 | 25 | 35 | 40 | 45 | 50 |
| 194 | 417387.13 | 5048292.60 | 38 | 39 | 42 | 46 | 50 |
| 195 | 419395.81 | 5048267.11 | 37 | 39 | 42 | 46 | 50 |
| 196 | 415890.96 | 5048319.11 | 26 | 35 | 40 | 45 | 50 |
| 197 | 415834.60 | 5048315.49 | 25 | 35 | 40 | 45 | 50 |
| 198 | 417443.65 | 5048311.42 | 39 | 40 | 42 | 46 | 50 |
| 199 | 416533.07 | 5048323.15 | 30 | 36 | 40 | 45 | 50 |
| 200 | 415967.09 | 5048338.42 | 27 | 35 | 40 | 45 | 50 |
| 201 | 416025.50 | 5048349.57 | 27 | 35 | 40 | 45 | 50 |
| 202 | 416103.83 | 5048357.47 | 28 | 35 | 40 | 45 | 50 |
| 203 | 415774.53 | 5048367.81 | 26 | 35 | 40 | 45 | 50 |
| 204 | 415898.06 | 5048381.58 | 26 | 35 | 40 | 45 | 50 |
| 205 | 415832.04 | 5048379.28 | 26 | 35 | 40 | 45 | 50 |
| 206 | 415962.70 | 5048402.65 | 27 | 35 | 40 | 45 | 50 |
| 207 | 416098.24 | 5048403.20 | 28 | 35 | 40 | 45 | 50 |
| 208 | 416036.62 | 5048411.51 | 27 | 35 | 40 | 45 | 50 |
| 209 | 415917.02 | 5048420.24 | 26 | 35 | 40 | 45 | 50 |
| 210 | 415776.27 | 5048424.45 | 26 | 35 | 40 | 45 | 50 |
| 211 | 415832.24 | 5048429.38 | 26 | 35 | 40 | 45 | 50 |
| 212 | 416098.49 | 5048457.41 | 27 | 35 | 40 | 45 | 50 |
| 213 | 415864.97 | 5048476.07 | 26 | 35 | 40 | 45 | 50 |
| 214 | 416017.64 | 5048480.68 | 27 | 35 | 40 | 45 | 50 |
| 215 | 415794.99 | 5048495.79 | 26 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 216 | 417754.77 | 5048478.82 | 41 | 42 | 44 | 47 | 51 |
| 217 | 417705.30 | 5048473.80 | 41 | 42 | 43 | 46 | 51 |
| 218 | 415960.67 | 5048504.86 | 27 | 35 | 40 | 45 | 50 |
| 219 | 420808.15 | 5048448.76 | 32 | 36 | 41 | 45 | 50 |
| 220 | 416578.44 | 5048501.28 | 30 | 36 | 40 | 45 | 50 |
| 221 | 421056.78 | 5048441.54 | 30 | 36 | 40 | 45 | 50 |
| 222 | 420872.97 | 5048453.67 | 32 | 36 | 41 | 45 | 50 |
| 223 | 420914.59 | 5048451.90 | 31 | 36 | 41 | 45 | 50 |
| 224 | 420845.06 | 5048452.86 | 32 | 36 | 41 | 45 | 50 |
| 225 | 421139.48 | 5048447.52 | 30 | 35 | 40 | 45 | 50 |
| 226 | 417829.81 | 5048496.73 | 42 | 43 | 44 | 47 | 51 |
| 227 | 416095.92 | 5048519.74 | 27 | 35 | 40 | 45 | 50 |
| 228 | 420994.65 | 5048463.84 | 31 | 36 | 40 | 45 | 50 |
| 229 | 415896.93 | 5048529.40 | 26 | 35 | 40 | 45 | 50 |
| 230 | 418051.82 | 5048504.16 | 44 | 44 | 45 | 48 | 51 |
| 231 | 420959.68 | 5048468.59 | 31 | 36 | 40 | 45 | 50 |
| 232 | 416029.61 | 5048541.36 | 27 | 35 | 40 | 45 | 50 |
| 233 | 415844.14 | 5048546.73 | 26 | 35 | 40 | 45 | 50 |
| 234 | 418493.59 | 5048525.27 | 45 | 45 | 46 | 48 | 51 |
| 235 | 421357.09 | 5048492.23 | 29 | 35 | 40 | 45 | 50 |
| 236 | 415966.27 | 5048568.17 | 27 | 35 | 40 | 45 | 50 |
| 237 | 416109.12 | 5048577.79 | 27 | 35 | 40 | 45 | 50 |
| 238 | 415797.15 | 5048590.31 | 26 | 35 | 40 | 45 | 50 |
| 239 | 416074.21 | 5048598.66 | 27 | 35 | 40 | 45 | 50 |
| 240 | 417839.39 | 5048584.22 | 41 | 42 | 44 | 47 | 51 |
| 241 | 418000.27 | 5048583.80 | 42 | 43 | 44 | 47 | 51 |
| 242 | 417624.91 | 5048587.25 | 39 | 40 | 43 | 46 | 50 |
| 243 | 420662.66 | 5048544.52 | 34 | 37 | 41 | 45 | 50 |
| 244 | 415879.95 | 5048609.10 | 26 | 35 | 40 | 45 | 50 |
| 245 | 421365.00 | 5048547.66 | 28 | 35 | 40 | 45 | 50 |
| 246 | 415831.22 | 5048636.17 | 26 | 35 | 40 | 45 | 50 |
| 247 | 419863.40 | 5048584.50 | 38 | 40 | 42 | 46 | 50 |
| 248 | 417569.66 | 5048617.19 | 39 | 40 | 42 | 46 | 50 |
| 249 | 417479.91 | 5048624.90 | 37 | 39 | 42 | 46 | 50 |
| 250 | 415762.97 | 5048648.68 | 26 | 35 | 40 | 45 | 50 |
| 251 | 417424.43 | 5048633.15 | 36 | 38 | 41 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 252 | 417376.54 | 5048645.57 | 35 | 38 | 41 | 45 | 50 |
| 253 | 421365.03 | 5048590.36 | 28 | 35 | 40 | 45 | 50 |
| 254 | 415797.67 | 5048672.17 | 26 | 35 | 40 | 45 | 50 |
| 255 | 416938.17 | 5048667.32 | 32 | 36 | 41 | 45 | 50 |
| 256 | 415764.00 | 5048759.96 | 25 | 35 | 40 | 45 | 50 |
| 257 | 421357.60 | 5048684.20 | 28 | 35 | 40 | 45 | 50 |
| 258 | 418022.15 | 5048733.40 | 41 | 41 | 43 | 46 | 50 |
| 259 | 421091.40 | 5048700.43 | 29 | 35 | 40 | 45 | 50 |
| 260 | 420659.75 | 5048709.85 | 33 | 37 | 41 | 45 | 50 |
| 261 | 418558.96 | 5048743.10 | 41 | 42 | 44 | 47 | 51 |
| 262 | 419250.22 | 5048742.30 | 37 | 39 | 42 | 46 | 50 |
| 263 | 421216.89 | 5048724.76 | 28 | 35 | 40 | 45 | 50 |
| 264 | 419029.03 | 5048758.81 | 39 | 40 | 42 | 46 | 50 |
| 265 | 419183.21 | 5048766.12 | 37 | 39 | 42 | 46 | 50 |
| 266 | 415769.06 | 5048812.50 | 25 | 35 | 40 | 45 | 50 |
| 267 | 419762.52 | 5048773.35 | 37 | 39 | 42 | 46 | 50 |
| 268 | 421160.06 | 5048761.90 | 28 | 35 | 40 | 45 | 50 |
| 269 | 421092.08 | 5048765.33 | 29 | 35 | 40 | 45 | 50 |
| 270 | 421056.96 | 5048764.02 | 29 | 35 | 40 | 45 | 50 |
| 271 | 417266.83 | 5048822.39 | 34 | 37 | 41 | 45 | 50 |
| 272 | 417318.89 | 5048822.90 | 34 | 37 | 41 | 45 | 50 |
| 273 | 415930.39 | 5048842.87 | 26 | 35 | 40 | 45 | 50 |
| 274 | 416965.58 | 5048831.91 | 32 | 36 | 41 | 45 | 50 |
| 275 | 417221.17 | 5048832.03 | 33 | 37 | 41 | 45 | 50 |
| 276 | 415982.50 | 5048842.90 | 26 | 35 | 40 | 45 | 50 |
| 277 | 416895.45 | 5048844.22 | 31 | 36 | 41 | 45 | 50 |
| 278 | 416841.47 | 5048839.69 | 31 | 36 | 41 | 45 | 50 |
| 279 | 417175.33 | 5048840.52 | 33 | 36 | 41 | 45 | 50 |
| 280 | 417116.00 | 5048843.71 | 33 | 36 | 41 | 45 | 50 |
| 281 | 417066.75 | 5048848.85 | 32 | 36 | 41 | 45 | 50 |
| 282 | 417374.01 | 5048850.73 | 34 | 37 | 41 | 45 | 50 |
| 283 | 417013.37 | 5048856.59 | 32 | 36 | 41 | 45 | 50 |
| 284 | 417678.48 | 5048841.34 | 38 | 39 | 42 | 46 | 50 |
| 285 | 417717.69 | 5048853.82 | 38 | 39 | 42 | 46 | 50 |
| 286 | 417426.79 | 5048861.79 | 34 | 37 | 41 | 45 | 50 |
| 287 | 417473.71 | 5048861.00 | 35 | 37 | 41 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 288 | 417620.59 | 5048860.97 | 36 | 38 | 42 | 46 | 50 |
| 289 | 417532.33 | 5048862.19 | 35 | 37 | 41 | 45 | 50 |
| 290 | 417571.98 | 5048856.83 | 36 | 38 | 41 | 45 | 50 |
| 291 | 416156.91 | 5048880.45 | 27 | 35 | 40 | 45 | 50 |
| 292 | 415910.14 | 5048893.02 | 26 | 35 | 40 | 45 | 50 |
| 293 | 416000.52 | 5048892.23 | 26 | 35 | 40 | 45 | 50 |
| 294 | 416118.09 | 5048898.40 | 27 | 35 | 40 | 45 | 50 |
| 295 | 419175.77 | 5048862.21 | 37 | 38 | 42 | 46 | 50 |
| 296 | 419314.85 | 5048891.62 | 37 | 39 | 42 | 46 | 50 |
| 297 | 420842.27 | 5048876.11 | 30 | 35 | 40 | 45 | 50 |
| 298 | 418116.68 | 5048917.25 | 39 | 41 | 43 | 46 | 50 |
| 299 | 420506.22 | 5048884.83 | 33 | 36 | 41 | 45 | 50 |
| 300 | 417929.69 | 5048927.68 | 39 | 40 | 42 | 46 | 50 |
| 301 | 417545.46 | 5048939.28 | 35 | 37 | 41 | 45 | 50 |
| 302 | 416085.68 | 5048963.88 | 27 | 35 | 40 | 45 | 50 |
| 303 | 417447.12 | 5048947.23 | 34 | 37 | 41 | 45 | 50 |
| 304 | 417619.82 | 5048947.99 | 35 | 37 | 41 | 45 | 50 |
| 305 | 418662.23 | 5048939.15 | 39 | 40 | 42 | 46 | 50 |
| 306 | 417383.46 | 5048955.63 | 34 | 37 | 41 | 45 | 50 |
| 307 | 416019.57 | 5048981.75 | 26 | 35 | 40 | 45 | 50 |
| 308 | 419475.87 | 5048950.06 | 39 | 40 | 42 | 46 | 50 |
| 309 | 417988.69 | 5048973.15 | 38 | 40 | 42 | 46 | 50 |
| 310 | 417560.49 | 5048989.02 | 34 | 37 | 41 | 45 | 50 |
| 311 | 417447.32 | 5048994.34 | 34 | 37 | 41 | 45 | 50 |
| 312 | 417382.28 | 5049008.41 | 33 | 37 | 41 | 45 | 50 |
| 313 | 420789.05 | 5048980.18 | 30 | 35 | 40 | 45 | 50 |
| 314 | 419859.11 | 5049009.61 | 35 | 38 | 41 | 45 | 50 |
| 315 | 417385.81 | 5049051.17 | 33 | 36 | 41 | 45 | 50 |
| 316 | 417563.88 | 5049053.90 | 34 | 37 | 41 | 45 | 50 |
| 317 | 417495.83 | 5049058.18 | 33 | 37 | 41 | 45 | 50 |
| 318 | 417443.86 | 5049059.44 | 33 | 37 | 41 | 45 | 50 |
| 319 | 417383.88 | 5049098.98 | 29 | 35 | 40 | 45 | 50 |
| 320 | 418182.23 | 5049216.58 | 35 | 37 | 41 | 45 | 50 |
| 321 | 417396.00 | 5049245.75 | 30 | 35 | 40 | 45 | 50 |
| 322 | 420892.64 | 5049275.76 | 29 | 35 | 40 | 45 | 50 |
| 323 | 418458.30 | 5049395.80 | 33 | 37 | 41 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 324 | 420012.09 | 5049437.90 | 32 | 36 | 41 | 45 | 50 |
| 325 | 418272.06 | 5049536.89 | 33 | 36 | 41 | 45 | 50 |
| 326 | 421879.94 | 5049585.33 | 25 | 34 | 40 | 45 | 50 |
| 327 | 421262.50 | 5049628.73 | 26 | 35 | 40 | 45 | 50 |
| 328 | 419592.05 | 5049660.69 | 34 | 37 | 41 | 45 | 50 |
| 329 | 421350.74 | 5049723.47 | 26 | 35 | 40 | 45 | 50 |
| 330 | 419014.99 | 5049757.57 | 31 | 36 | 41 | 45 | 50 |
| 331 | 421441.99 | 5049756.79 | 26 | 35 | 40 | 45 | 50 |
| 332 | 418416.10 | 5049831.63 | 31 | 36 | 40 | 45 | 50 |
| 333 | 418868.98 | 5049828.88 | 31 | 36 | 40 | 45 | 50 |
| 334 | 420174.71 | 5049848.75 | 33 | 36 | 41 | 45 | 50 |
| 335 | 421271.85 | 5049857.05 | 28 | 35 | 40 | 45 | 50 |
| 336 | 419952.40 | 5049974.11 | 30 | 35 | 40 | 45 | 50 |
| 337 | 419111.52 | 5050080.28 | 29 | 35 | 40 | 45 | 50 |
| 338 | 419832.28 | 5050078.86 | 30 | 35 | 40 | 45 | 50 |
| 339 | 418999.72 | 5050166.32 | 29 | 35 | 40 | 45 | 50 |
| 340 | 421535.88 | 5050195.44 | 27 | 35 | 40 | 45 | 50 |
| 341 | 418718.89 | 5050255.80 | 29 | 35 | 40 | 45 | 50 |
| 342 | 417387.16 | 5050366.95 | 23 | 34 | 40 | 45 | 50 |
| 343 | 419366.21 | 5050355.15 | 29 | 35 | 40 | 45 | 50 |
| 344 | 419364.44 | 5050402.63 | 29 | 35 | 40 | 45 | 50 |
| 345 | 419818.72 | 5050396.81 | 31 | 36 | 41 | 45 | 50 |
| 346 | 419020.88 | 5050414.61 | 28 | 35 | 40 | 45 | 50 |
| 347 | 417364.07 | 5050480.77 | 23 | 34 | 40 | 45 | 50 |
| 348 | 417102.13 | 5050491.72 | 23 | 34 | 40 | 45 | 50 |
| 349 | 419167.81 | 5050466.04 | 28 | 35 | 40 | 45 | 50 |
| 350 | 419734.22 | 5050456.64 | 30 | 36 | 40 | 45 | 50 |
| 351 | 421431.99 | 5050444.53 | 25 | 35 | 40 | 45 | 50 |
| 352 | 420837.92 | 5050453.87 | 40 | 41 | 43 | 46 | 50 |
| 353 | 419278.32 | 5050546.59 | 28 | 35 | 40 | 45 | 50 |
| 354 | 421327.13 | 5050519.88 | 30 | 35 | 40 | 45 | 50 |
| 355 | 417127.76 | 5050583.83 | 25 | 34 | 40 | 45 | 50 |
| 356 | 419867.09 | 5050551.69 | 32 | 36 | 41 | 45 | 50 |
| 357 | 419810.42 | 5050686.91 | 31 | 36 | 40 | 45 | 50 |
| 358 | 419746.79 | 5050765.72 | 30 | 35 | 40 | 45 | 50 |
| 359 | 417796.25 | 5050824.51 | 24 | 34 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 360 | 417794.78 | 5050943.17 | 23 | 34 | 40 | 45 | 50 |
| 361 | 419717.91 | 5050942.27 | 30 | 35 | 40 | 45 | 50 |
| 362 | 419736.30 | 5051028.44 | 30 | 35 | 40 | 45 | 50 |
| 363 | 417811.22 | 5051063.86 | 23 | 34 | 40 | 45 | 50 |
| 364 | 417812.57 | 5051116.54 | 22 | 34 | 40 | 45 | 50 |
| 365 | 421188.27 | 5051168.32 | 26 | 35 | 40 | 45 | 50 |
| 366 | 419639.56 | 5051208.64 | 25 | 35 | 40 | 45 | 50 |
| 367 | 419828.63 | 5051292.64 | 29 | 35 | 40 | 45 | 50 |
| 368 | 417811.00 | 5051354.94 | 22 | 34 | 40 | 45 | 50 |
| 369 | 421289.20 | 5051335.33 | 24 | 34 | 40 | 45 | 50 |
| 370 | 420555.13 | 5051394.20 | 33 | 36 | 41 | 45 | 50 |
| 371 | 419709.36 | 5051410.15 | 24 | 34 | 40 | 45 | 50 |
| 372 | 417863.65 | 5051455.27 | 22 | 34 | 40 | 45 | 50 |
| 373 | 417803.51 | 5051559.55 | 22 | 34 | 40 | 45 | 50 |
| 374 | 417864.63 | 5051831.62 | 20 | 34 | 40 | 45 | 50 |
| 375 | 419017.60 | 5051933.06 | 20 | 34 | 40 | 45 | 50 |
| 376 | 418436.92 | 5052026.94 | 20 | 34 | 40 | 45 | 50 |
| 377 | 420855.91 | 5052009.32 | 23 | 34 | 40 | 45 | 50 |
| 378 | 417995.55 | 5052063.46 | 19 | 34 | 40 | 45 | 50 |
| 379 | 419477.13 | 5052076.54 | 23 | 34 | 40 | 45 | 50 |
| 380 | 420823.82 | 5052104.11 | 20 | 34 | 40 | 45 | 50 |
| 381 | 420543.01 | 5052217.35 | 21 | 34 | 40 | 45 | 50 |
| 382 | 418768.77 | 5052247.99 | 20 | 34 | 40 | 45 | 50 |
| 383 | 421323.34 | 5052618.89 | 18 | 34 | 40 | 45 | 50 |
| 384 | 418597.39 | 5052850.17 | 18 | 34 | 40 | 45 | 50 |
| 385 | 421347.03 | 5053342.21 | 16 | 34 | 40 | 45 | 50 |
| 386 | 421351.96 | 5053458.29 | 15 | 34 | 40 | 45 | 50 |
| 387 | 421422.70 | 5053505.74 | 16 | 34 | 40 | 45 | 50 |
| 388 | 422174.68 | 5047340.65 | 25 | 34 | 40 | 45 | 50 |
| 389 | 422431.74 | 5047413.88 | 23 | 34 | 40 | 45 | 50 |
| 390 | 422955.64 | 5047545.54 | 21 | 34 | 40 | 45 | 50 |
| 391 | 422076.32 | 5047969.99 | 25 | 35 | 40 | 45 | 50 |
| 392 | 422541.89 | 5047997.03 | 22 | 34 | 40 | 45 | 50 |
| 393 | 422323.20 | 5048108.69 | 23 | 34 | 40 | 45 | 50 |
| 394 | 423698.47 | 5048101.07 | 17 | 34 | 40 | 45 | 50 |
| 395 | 422294.76 | 5048284.18 | 23 | 34 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 396 | 423540.69 | 5048738.59 | 18 | 34 | 40 | 45 | 50 |
| 397 | 423078.31 | 5048826.57 | 19 | 34 | 40 | 45 | 50 |
| 398 | 422383.22 | 5048915.60 | 21 | 34 | 40 | 45 | 50 |
| 399 | 422451.23 | 5048922.21 | 21 | 34 | 40 | 45 | 50 |
| 400 | 422568.05 | 5048928.76 | 21 | 34 | 40 | 45 | 50 |
| 401 | 422710.02 | 5048931.28 | 21 | 34 | 40 | 45 | 50 |
| 402 | 422809.30 | 5048932.54 | 20 | 34 | 40 | 45 | 50 |
| 403 | 422660.39 | 5048932.69 | 21 | 34 | 40 | 45 | 50 |
| 404 | 422846.85 | 5048937.22 | 19 | 34 | 40 | 45 | 50 |
| 405 | 422884.68 | 5048938.35 | 20 | 34 | 40 | 45 | 50 |
| 406 | 422926.85 | 5048941.76 | 20 | 34 | 40 | 45 | 50 |
| 407 | 423002.61 | 5048940.87 | 19 | 34 | 40 | 45 | 50 |
| 408 | 423533.89 | 5048939.00 | 17 | 34 | 40 | 45 | 50 |
| 409 | 422766.48 | 5048945.73 | 20 | 34 | 40 | 45 | 50 |
| 410 | 423081.45 | 5048953.65 | 19 | 34 | 40 | 45 | 50 |
| 411 | 423016.18 | 5049005.17 | 19 | 34 | 40 | 45 | 50 |
| 412 | 423087.32 | 5049017.01 | 19 | 34 | 40 | 45 | 50 |
| 413 | 423171.87 | 5049031.05 | 18 | 34 | 40 | 45 | 50 |
| 414 | 422340.07 | 5049218.89 | 20 | 34 | 40 | 45 | 50 |
| 415 | 422578.89 | 5049573.54 | 19 | 34 | 40 | 45 | 50 |
| 416 | 422272.61 | 5049579.69 | 22 | 34 | 40 | 45 | 50 |
| 417 | 422508.51 | 5049674.67 | 19 | 34 | 40 | 45 | 50 |
| 418 | 422693.11 | 5049691.73 | 19 | 34 | 40 | 45 | 50 |
| 419 | 422643.25 | 5049765.47 | 19 | 34 | 40 | 45 | 50 |
| 420 | 422391.03 | 5049784.43 | 20 | 34 | 40 | 45 | 50 |
| 421 | 422437.06 | 5049845.00 | 20 | 34 | 40 | 45 | 50 |
| 422 | 422973.94 | 5049857.92 | 18 | 34 | 40 | 45 | 50 |
| 423 | 423234.92 | 5049957.66 | 18 | 34 | 40 | 45 | 50 |
| 424 | 422841.41 | 5051027.41 | 18 | 34 | 40 | 45 | 50 |
| 425 | 422134.59 | 5051165.90 | 20 | 34 | 40 | 45 | 50 |
| 426 | 422415.59 | 5051658.31 | 19 | 34 | 40 | 45 | 50 |
| 427 | 423026.60 | 5051731.69 | 17 | 34 | 40 | 45 | 50 |
| 428 | 422814.71 | 5051920.18 | 16 | 34 | 40 | 45 | 50 |
| 429 | 422781.83 | 5052475.16 | 16 | 34 | 40 | 45 | 50 |
| 430 | 419543.33 | 5051996.65 | 23 | 34 | 40 | 45 | 50 |
| 431 | 419068.87 | 5045515.77 | 21 | 34 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 432 | 418786.96 | 5045654.25 | 26 | 35 | 40 | 45 | 50 |
| 433 | 418917.12 | 5045665.06 | 22 | 34 | 40 | 45 | 50 |
| 434 | 418794.08 | 5045856.19 | 27 | 35 | 40 | 45 | 50 |
| 435 | 418888.41 | 5045889.82 | 28 | 35 | 40 | 45 | 50 |
| 436 | 418923.69 | 5045906.22 | 28 | 35 | 40 | 45 | 50 |
| 437 | 418963.06 | 5045916.89 | 28 | 35 | 40 | 45 | 50 |
| 438 | 418988.49 | 5045853.73 | 27 | 35 | 40 | 45 | 50 |
| 439 | 418934.35 | 5045838.96 | 27 | 35 | 40 | 45 | 50 |
| 440 | 419089.84 | 5045926.34 | 28 | 35 | 40 | 45 | 50 |
| 441 | 419098.91 | 5045960.95 | 28 | 35 | 40 | 45 | 50 |
| 442 | 419097.67 | 5045745.54 | 23 | 34 | 40 | 45 | 50 |
| 443 | 418089.24 | 5045901.96 | 27 | 35 | 40 | 45 | 50 |
| 444 | 418076.11 | 5045901.96 | 27 | 35 | 40 | 45 | 50 |
| 445 | 418043.56 | 5045908.26 | 27 | 35 | 40 | 45 | 50 |
| 446 | 418088.71 | 5045958.13 | 28 | 35 | 40 | 45 | 50 |
| 447 | 418074.01 | 5045959.71 | 28 | 35 | 40 | 45 | 50 |
| 448 | 418060.36 | 5045961.81 | 28 | 35 | 40 | 45 | 50 |
| 449 | 418044.61 | 5045963.91 | 28 | 35 | 40 | 45 | 50 |
| 450 | 418030.96 | 5045966.53 | 28 | 35 | 40 | 45 | 50 |
| 451 | 418015.22 | 5045970.73 | 28 | 35 | 40 | 45 | 50 |
| 452 | 417966.92 | 5045976.51 | 28 | 35 | 40 | 45 | 50 |
| 453 | 417953.27 | 5045977.56 | 28 | 35 | 40 | 45 | 50 |
| 454 | 417934.89 | 5045979.66 | 28 | 35 | 40 | 45 | 50 |
| 455 | 417919.67 | 5045983.86 | 28 | 35 | 40 | 45 | 50 |
| 456 | 417954.32 | 5045925.58 | 27 | 35 | 40 | 45 | 50 |
| 457 | 417897.10 | 5045924.01 | 27 | 35 | 40 | 45 | 50 |
| 458 | 417859.30 | 5045907.21 | 27 | 35 | 40 | 45 | 50 |
| 459 | 417845.12 | 5045898.28 | 27 | 35 | 40 | 45 | 50 |
| 460 | 417831.47 | 5045878.86 | 27 | 35 | 40 | 45 | 50 |
| 461 | 417820.97 | 5045866.79 | 27 | 35 | 40 | 45 | 50 |
| 462 | 417816.77 | 5045840.54 | 27 | 35 | 40 | 45 | 50 |
| 463 | 417793.15 | 5045917.18 | 27 | 35 | 40 | 45 | 50 |
| 464 | 417760.08 | 5045837.91 | 26 | 35 | 40 | 45 | 50 |
| 465 | 417759.55 | 5045824.26 | 26 | 35 | 40 | 45 | 50 |
| 466 | 417763.75 | 5045786.46 | 26 | 35 | 40 | 45 | 50 |
| 467 | 417766.38 | 5045696.17 | 25 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 468 | 417764.28 | 5045672.02 | 25 | 35 | 40 | 45 | 50 |
| 469 | 418101.31 | 5045644.72 | 21 | 34 | 40 | 45 | 50 |
| 470 | 418117.06 | 5045642.10 | 21 | 34 | 40 | 45 | 50 |
| 471 | 416399.22 | 5047646.38 | 28 | 35 | 40 | 45 | 50 |
| 472 | 416379.47 | 5047639.66 | 28 | 35 | 40 | 45 | 50 |
| 473 | 416366.86 | 5047635.46 | 29 | 35 | 40 | 45 | 50 |
| 474 | 416371.06 | 5047677.49 | 28 | 35 | 40 | 45 | 50 |
| 475 | 416353.41 | 5047673.71 | 28 | 35 | 40 | 45 | 50 |
| 476 | 416337.43 | 5047671.60 | 28 | 35 | 40 | 45 | 50 |
| 477 | 416358.87 | 5047545.09 | 28 | 35 | 40 | 45 | 50 |
| 478 | 416373.16 | 5047485.40 | 28 | 35 | 40 | 45 | 50 |
| 479 | 416475.51 | 5048306.91 | 30 | 35 | 40 | 45 | 50 |
| 480 | 417338.56 | 5047007.39 | 31 | 36 | 40 | 45 | 50 |
| 481 | 416435.95 | 5046685.41 | 26 | 35 | 40 | 45 | 50 |
| 482 | 416389.02 | 5046787.43 | 26 | 35 | 40 | 45 | 50 |
| 483 | 416276.12 | 5046643.92 | 26 | 35 | 40 | 45 | 50 |
| 484 | 416175.46 | 5046518.09 | 25 | 34 | 40 | 45 | 50 |
| 485 | 416155.73 | 5046520.82 | 25 | 34 | 40 | 45 | 50 |
| 486 | 416128.53 | 5046522.86 | 25 | 34 | 40 | 45 | 50 |
| 487 | 416082.96 | 5046526.94 | 25 | 34 | 40 | 45 | 50 |
| 488 | 416246.19 | 5046751.38 | 26 | 35 | 40 | 45 | 50 |
| 489 | 416313.53 | 5046935.70 | 27 | 35 | 40 | 45 | 50 |
| 490 | 416251.63 | 5046905.78 | 26 | 35 | 40 | 45 | 50 |
| 491 | 416225.11 | 5046903.06 | 26 | 35 | 40 | 45 | 50 |
| 492 | 416571.30 | 5047365.55 | 29 | 35 | 40 | 45 | 50 |
| 493 | 418839.91 | 5047466.99 | 38 | 39 | 42 | 46 | 50 |
| 494 | 418357.51 | 5045353.15 | 24 | 34 | 40 | 45 | 50 |
| 495 | 421534.19 | 5047427.53 | 31 | 36 | 40 | 45 | 50 |
| 496 | 421701.19 | 5047644.01 | 29 | 35 | 40 | 45 | 50 |
| 497 | 421616.66 | 5047731.64 | 30 | 35 | 40 | 45 | 50 |
| 498 | 421547.88 | 5047909.73 | 31 | 36 | 41 | 45 | 50 |
| 499 | 421635.63 | 5047005.21 | 28 | 35 | 40 | 45 | 50 |
| 500 | 416111.35 | 5046575.79 | 25 | 35 | 40 | 45 | 50 |
| 501 | 416129.71 | 5046573.37 | 25 | 35 | 40 | 45 | 50 |
| 502 | 416433.91 | 5046824.80 | 27 | 35 | 40 | 45 | 50 |
| 503 | 416411.82 | 5046826.66 | 27 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 504 | 416391.68 | 5046826.22 | 27 | 35 | 40 | 45 | 50 |
| 505 | 416380.28 | 5046938.70 | 27 | 35 | 40 | 45 | 50 |
| 506 | 416401.38 | 5046936.52 | 27 | 35 | 40 | 45 | 50 |
| 507 | 416396.30 | 5046910.59 | 27 | 35 | 40 | 45 | 50 |
| 508 | 416528.88 | 5047047.62 | 28 | 35 | 40 | 45 | 50 |
| 509 | 416267.42 | 5046969.26 | 27 | 35 | 40 | 45 | 50 |
| 510 | 416246.66 | 5046981.51 | 26 | 35 | 40 | 45 | 50 |
| 511 | 416226.15 | 5046992.98 | 26 | 35 | 40 | 45 | 50 |
| 512 | 416332.89 | 5047577.51 | 28 | 35 | 40 | 45 | 50 |
| 513 | 416368.18 | 5047600.41 | 29 | 35 | 40 | 45 | 50 |
| 514 | 416341.16 | 5047601.57 | 29 | 35 | 40 | 45 | 50 |
| 515 | 416332.83 | 5047639.58 | 28 | 35 | 40 | 45 | 50 |
| 516 | 416322.20 | 5047638.42 | 28 | 35 | 40 | 45 | 50 |
| 517 | 416308.84 | 5047660.71 | 28 | 35 | 40 | 45 | 50 |
| 518 | 416322.23 | 5047662.18 | 28 | 35 | 40 | 45 | 50 |
| 519 | 416386.76 | 5047678.73 | 28 | 35 | 40 | 45 | 50 |
| 520 | 418029.13 | 5045913.93 | 27 | 35 | 40 | 45 | 50 |
| 521 | 417760.43 | 5045724.08 | 26 | 35 | 40 | 45 | 50 |
| 522 | 417817.58 | 5045707.04 | 26 | 35 | 40 | 45 | 50 |
| 523 | 417765.32 | 5045658.85 | 25 | 35 | 40 | 45 | 50 |
| 524 | 417871.30 | 5045631.31 | 22 | 34 | 40 | 45 | 50 |
| 525 | 417886.37 | 5045632.80 | 22 | 34 | 40 | 45 | 50 |
| 526 | 417901.65 | 5045632.78 | 20 | 34 | 40 | 45 | 50 |
| 527 | 417915.74 | 5045631.78 | 20 | 34 | 40 | 45 | 50 |
| 528 | 417964.61 | 5045629.50 | 20 | 34 | 40 | 45 | 50 |
| 529 | 417979.21 | 5045629.67 | 21 | 34 | 40 | 45 | 50 |
| 530 | 418054.68 | 5045646.34 | 21 | 34 | 40 | 45 | 50 |
| 531 | 417763.40 | 5045755.16 | 26 | 35 | 40 | 45 | 50 |
| 532 | 418578.14 | 5045651.01 | 26 | 35 | 40 | 45 | 50 |
| 533 | 418740.61 | 5045665.59 | 26 | 35 | 40 | 45 | 50 |
| 534 | 419017.35 | 5045804.02 | 27 | 35 | 40 | 45 | 50 |
| 535 | 419019.21 | 5045920.27 | 28 | 35 | 40 | 45 | 50 |
| 536 | 419090.55 | 5046026.60 | 28 | 35 | 40 | 45 | 50 |
| 537 | 418949.20 | 5046142.88 | 28 | 35 | 40 | 45 | 50 |
| 538 | 418953.75 | 5046112.01 | 28 | 35 | 40 | 45 | 50 |
| 539 | 418747.62 | 5046085.64 | 28 | 35 | 40 | 45 | 50 |

| Receptor ID | Coordinates UTM NAD83 Zone 15N | | Modeled Project Only $L_{50}$ Sound Level (dBA)[1] | Total $L_{50}$ Sound Level, dBA[1] (Modeled + Ambient) | | | |
|---|---|---|---|---|---|---|---|
| | X (m) | Y (m) | | 34 dBA Ambient | 40 dBA Ambient | 45 dBA Ambient | 50 dBA Ambient |
| 540 | 418923.29 | 5045492.59 | 20 | 34 | 40 | 45 | 50 |
| 541 | 421635.77 | 5047445.82 | 30 | 35 | 40 | 45 | 50 |
| 542 | 417908.18 | 5051660.38 | 21 | 34 | 40 | 45 | 50 |
| 543 | 423173.04 | 5051304.09 | 17 | 34 | 40 | 45 | 50 |
| 544 | 419969.88 | 5051237.73 | 29 | 35 | 40 | 45 | 50 |
| 545 | 420421.31 | 5046656.30 | 28 | 35 | 40 | 45 | 50 |
| 546 | 418389.85 | 5046160.12 | 29 | 35 | 40 | 45 | 50 |
| 547 | 422323.56 | 5049354.88 | 20 | 34 | 40 | 45 | 50 |
| 548 | 423104.88 | 5050352.91 | 18 | 34 | 40 | 45 | 50 |
| 549 | 422964.60 | 5048940.89 | 19 | 34 | 40 | 45 | 50 |

[1] Sound pressure levels rounded to the nearest whole decibel are shown. Sound level addition was performed with greater precision.