Appendix F

Agricultural Impact Mitigation Plan

Xcel Energy
Docket No. E-002/GS-21-191
Docket No. E-002/TL-21-190
Docket No. E-002/TL-21-189
April 2021

Agricultural Impact Mitigation Plan

Sherco Solar Project

Northern States Power Company

Sherburne County, Minnesota

April 2021

Xcel Energy
RESPONSIBLE BY NATURE™

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ABBREVIATIONS & DEFINITIONS

AC	alternating current
BMPs	best management practices
BWSR	Minnesota Board of Water and Soil Resources
DC	direct current
decompaction	Treatment which relieves soil compaction by introducing air space into the soil.
drain tile	Typically, a below-ground system that removes excess water from the soil.
GIS	Geographic Information System
GPS	global positioning system
kV	kilovolt
LCC	Land Capability Class
MDA	Minnesota Department of Agriculture
MNDNR	Minnesota Department of Natural Resources
MW	megawatt
NG Renewables	National Grid Renewables Development, LLC
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSP	Northern States Power
Plan or AIMP	Agricultural Impact Mitigation Plan
Project / Project Site / Project Area	Sherco Solar Project
Project Footprint	Approximate 3,024-acre area where Xcel Energy proposes to build the Solar Project facilities.
PUC	Public Utilities Commission
PV	photovoltaic
SCADA	Supervisory Control and Data Acquisition
Solar Project Area	Approximately 3,480-acre area of privately-owned land for which Sherco Solar, LLC and Nicollet Land Services, LLC has leases and purchase options to allow siting and construction of the Solar Project.
SSURGO	Soil Survey Geographic Database
SWPPP	Storm Water Pollution Prevention Plan

1.0 Purpose and Applicability of Plan

Northern States Power Company, doing business as Xcel Energy, is developing a 460 megawatt (MW) solar project on approximately 3,480 acres in Sherburne County, Minnesota (Sherco Solar Project or Project; Figure 1). The Project size makes this the largest solar generation facility in Minnesota and one of the largest facilities in the United States. The Project represents a joint development between Xcel Energy and National Grid Renewables Development, LLC (NG Renewables). The Project will be constructed, owned, and operated by Xcel Energy.

The objective of this Agricultural Impact Mitigation (the Plan or AIMP) is to identify measures that Xcel Energy and its contractors will take to avoid, and/or repair potential negative agricultural impacts that may result from the construction, operation, and eventual decommissioning of the Sherco Solar Project (Project). Although Xcel Energy does not plan to incorporate agricultural production within the Project area during the life of the Project, this Plan outlines measures to ensure the land may be returned to future agricultural usages following the closure and decommissioning of the Project, including descriptions of best management practices (BMPs) that will be used during construction to minimize long-term impacts to soil. It is important to note that while Xcel Energy and the Construction Contractor hired to build the facility (the Contractor) fully intend to adhere to the specifics of this plan, certain practices may vary as the Contractor identifies methods that work more efficiently in this specific location and provide the highest degree of safety while constructing the facility.

Xcel Energy consulted with the Minnesota Department of Agriculture (MDA) in April 2021 to discuss the AIMP's contents and site-specific characteristics.

As noted above, the primary objective of the Plan is to mitigate for negative agricultural impacts after decommissioning of the Project. Agricultural use during operation of the Project was not considered for the Project or as a part of this plan, as Xcel Energy has prioritized the development of a diverse pollinator-friendly ground cover post construction. Through the implementation of its separately developed Vegetation Management Plan (VMP), the Solar Project will implement pollinator-friendly seed mixes that meet or exceed the Minnesota Board of Water and Soil Resources (BWSR) scorecard for Habitat-Friendly Solar and will allow the site to qualify for recognition of beneficial habitat as set forth in Minn. Stat. 216B.1642 (BWSR, 2020). The goals of the VMP in no way prevent effective implementation of this Plan, and the VMP was referenced during the development of this plan. Implementation of pollinator-friendly habitat may have long term benefits to soil health that will further assist in agricultural use post decommissioning. Such benefits include building topsoil through plant matter decay, carbon capture, and beneficial soil bacteria that are often absent from soils subject to row crop agriculture. A separate decommissioning plan has also been developed for this Project, which addresses many of the details related to future conversion of the site back to potential agricultural uses at the end of the Project's useful life, and is referenced in this Plan.

This Plan is separated into several distinct sections: Section 2 provides an overview of the proposed Project and its components. Section 3 addresses limitations and suitability of the soils at the Sherco Solar Project, Section 4 discusses the BMPs that will be used during construction and operation of the Project, and Section 5 outlines decommissioning.

2.0 Project Overview

2.1 Background

Xcel Energy proposes to construct the Solar Project, a solar energy conversion facility with a 460 MW AC nameplate capacity, in Clear Lake and Becker Townships, Sherburne County, Minnesota (Figure 1 – Solar Project Location). The Solar Project is proposed in two distinct blocks, which collectively create the Solar Project Area. The Solar Project Area covers 3,479.4 acres and is comprised of the West Block (1,653.7 acres), which is located on the west side of the Sherco Generating Plant and the East Block (1,825.7 acres), which is located on the east side of the Sherco Generating Plant. Based on preliminary design, Project facilities will cover approximately 3,024.2 acres of the Solar Project Area (Project Footprint). There are approximately 466 acres of the Solar Project Area for which Xcel Energy has site control, but are currently not contemplated for occupation by solar facilities (Figures 2a and 2b). Xcel Energy plans to construct the Project on a schedule that facilitates an in-service date by the end of 2024.

The Project would interconnect into the Sherburne County Substation, which is adjacent to the Solar Project. Existing infrastructure in the immediate vicinity of the Project, together with Xcel Owned Property, allows Xcel Energy to minimize the need to construct ancillary facilities on private land not owned by Xcel Energy.

The Project Site is on a nearly level, sandy outwash terrace (Richfield Terrace) of Quaternary age that lies approximately 30 to 70 feet above the current floodplain level of the Mississippi River. The nearly-level topography combined with the presence of readily-available, high quality water in the underlying unconfined sand and gravel aquifer is well suited to irrigated agriculture, which is currently the dominant land use for the Project Area.

2.2 Project Components

The Project will include the following major components, systems and associated facilities:

- Solar panels, racking system, and inverters;
- Electrical collection system;
- Two collection substations;
- Access roads;
- Stormwater basins; and
- Perimeter fencing.

Each of these components are summarized below. For a full description of solar equipment proposed, refer to Xcel Energy's Site Permit Application submitted to the Public Utilities Commission (PUC).

2.2.1 Configuration of Solar Panels, Arrays, and Racking

The Project will convert sunlight into direct current (DC) electrical energy within photovoltaic (PV) panels (panels). For purposes of describing construction, the Sherco project can be considered an aggregate of individual PV panel components interconnected by cabling and infrastructure at increasing scales to ultimately deliver up to 460 MW of alternating current (AC) of electricity to the existing Sherburne County Substation currently on the electrical grid and adjacent to the Project. From smallest to largest scales these are described below and presented on Figure 4a and 4b:

1. **Individual PV panels** are approximately 4 to 6.5 feet long by 2 to 3.5 feet wide by 1 to 2 inches thick and are installed on metal foundations that are driven or screwed into the ground.
2. **Lines** of interconnected PV panels consist of a line of short-edge butted panels approximately 200- to 300-feet long, with each line oriented to and rotating along a north-south axis to track the east-west movement of the sun and maximize the interception of solar energy. These lines represent the racking upon which the individual panels are mounted upon.
3. **Arrays** PV of north/south lines of PV panels organized in racks associated with an east/west oriented access road. Separation of PV Panel lines will typically be 24.5 feet from turning axis to turning axis.
4. **Groups** of PV panels typically consist of two arrays north, and two arrays south of a permanent access and maintenance road. Depending on site constraints, there may be fewer arrays associated with a specific group. Boundary access roads are typically present on the east and west sides of individual groups. Each group will consist of PV arrays connected to an inverter. Inverters convert the DC output of the panels to AC, which is required for delivery to the electrical transmission grid.
5. **Construction Units** consist of Groups of PV panels delineated by their connectivity and relationship to main roads. Generally, construction units consist of two groups.

2.2.2 Electrical Collection System

Electrical wiring will connect the panels to inverters, inverters will transform the power from DC to AC current. The AC current will be stepped up through transformer to 34.5 kV and brought via the collection cables to one of two Project collector substations. The electrical collection system is anticipated to be installed via a hybrid above-ground/below-ground system, but could also be installed completely below ground. Below-ground systems would be installed a depth of four feet. Cables connecting each unit of solar arrays may be bored under or spanned over county roads.

2.2.3 Collector Substations

The Solar Project will require two collector substations: The West Collector Substation, which will collect power from the West Block of the Solar Project Area and the East Collector Substation, which will collect power from the East Block. The West Collector Substation is located on the eastern edge of the West Block; its location was selected to minimize the length of the associated transmission line and to accommodate potential future development and transmission expansion. The East Collector Substation is located on the western edge of the East Block and was selected to minimize the length of the associated transmission line, avoid impacts to residences and agricultural buildings along 137th Street, and to accommodate potential future development and transmission expansion. Both the West and East Collector Substations will be 34.5/345 kV step-up substations with metering and switching gear required to connect to the transmission grid at the Sherburne County Substation.

2.2.4 Access Roads

The Project will include approximately 33.8 miles of graveled access roads that lead to the inverters, to provide ingress and egress to the Project, and also to assist in operation and maintenance of the Project. The final length of the access roads will depend on the equipment selected and final engineering. These roads are up to 16 feet wide along straight portions of the roads and wider along curves at internal road intersections (approximately 45 feet). There are 17 access points to the Project from existing county roads. These entrances will have locked gates.

2.2.5 Stormwater Basins

Xcel Energy has preliminarily designed 11 drainage basins throughout the Project Footprint that range in size from 0.2 to 4.8-acres (see Figures 3a and 3b – Preliminary Project Layout). These basins are located in existing low areas that are prone to ponding during rain events. These areas will be vegetated with a wet seed mix that will help stabilize soils after rain events.

2.2.6 Fencing

Permanent security fencing will be installed along the perimeter of the solar arrays.. Fencing will be secured to posts which will be directly embedded in the soil or set in concrete foundations as required for structural integrity. This fencing will be designed to prevent the public from gaining access to electrical equipment which could cause injury.

2.3 Construction

The following section identifies general construction methods for each stage of construction to provide context to typical construction practices within a solar array. BMPs that will be utilized for each of these methods, including implementation of an environmental monitor, soil segregation for excavations and decompaction, wet weather conditions, adaptive management, grading and construction, foundations, trenching, and temporary erosion and sediment controls are outlined in section 4. For a additional details regarding Project construction, refer to Xcel Energy's Site Permit Application submitted to the PUC.

2.3.1 Site Clearing & Vegetation Removal

Depending on timing of the start of construction, the Project may require the clearing of residual row-crop debris from the 2021 harvest season. Alternatively, and depending on construction timing, Xcel Energy may plant a cover crop to assist in soil stabilization assuming appropriate timing. Refer to the Vegetation Management Plan for additional details.

2.3.2 Earthwork

Some grading will be required to provide a more level workspace and maintain soil stability in areas with a slope greater than five percent. Refer to section 4 for best practices associated with soil segregation and BMPs for grading activities. The earthwork activities will be completed using typical civil construction equipment – scrapers, bulldozers, front-end loaders, back-hoes, or skid-steers.

2.3.3 Access Road Construction

As a component of earthwork, permanent access roads and permanent turnouts will be developed. This work will start with the stripping and segregating of topsoil materials from the anticipated up to16-foot-wide road width. Refer to section 4 for proper soil segregation and storage techniques for topsoil. The subgrade materials will be compacted 16-feet wide to the specified compaction requirements as laid out by the civil and geotechnical engineer. After compaction is reached and verified, the road will be installed as designed, typically done with or without geo-fabric or via soil cement stabilization methods depending on the soil type, and then, with a surface of 4 to 12 inches of gravel. The gravel will be placed level with the existing grade to facilitate drainage and minimize ponding. After gravel is installed and compacted to engineers' requirements, the Project drainage ditches will be shaped as identified on the final grading plan. Finally, the previously stripped and windrowed topsoil material will be re-spread throughout the Solar Project Area.

2.3.4 Solar Array Construction

Once grading activities are complete, the racking system supports will be constructed using steel piles driven into the ground via pile driving, or in limited circumstances helical screws or auger type foundations. The solar facilities will be constructed in blocks, and multiple blocks could be constructed simultaneously. Soil disturbance would be restricted to the hydraulic ram/screw machinery, about the size of a small tractor, temporarily disturbing soil at each pile insertion location and while driving between drilling locations. Pile driving of piers for the rack support will take approximately fifteen months. This includes three months of winter season where it is likely prohibitive to complete any pile driving work.

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

To the extent practicable, vehicular traffic will be limited to permanent and temporary access roads to minimize soil disturbance, mixing and compaction; however, some vehicular traffic will occur throughout the Project during construction. Refer to section 4 for additional BMPs during array construction.

2.3.5 Electrical Collection System

Underground collection system cabling will primarily be installed along access roads using trenching machine or excavator. The trencher will cut an exposed trench approximately 1 foot wide by 4 feet deep. Within the security fence, cables will be installed a depth of 4 feet; outside of the security fence, cables would be at least 5 feet below ground. Topsoil will be stripped and segregated from subsoil using a small backhoe, would be temporarily stored adjacent to the trench, and would be backfilled following cable installation. BMPs that will be used during these earthmoving activities are described in detail in Section 4.

2.3.6 Inverter Installation

The inverters units will be placed on frost-footing supported concrete pads or driven/helical screw pier foundations that will be designed to specifications necessary to meet the local geotechnical conditions. Topsoil will be removed and will be stored at suitable pre-established locations and graded to facilitate revegetation. Underground conduit and junction boxes will be installed throughout the project to facilitate required cabling connecting equipment. Premanufactured skids with inverter, transformer and SCADA equipment may be used. These arrive by typical flat-bed trailer and truck and are set in place by a Rough-terrain hydraulic crane.

2.3.7 Collector Substation Construction

Construction work within the substation sites will include site preparation and installation of substructures and electrical equipment. Installation of concrete foundations and embedments for equipment will require the use of trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. One of two methods will be used to install substation foundations. Option 1 would be to use a small rubber-tire backhoe to dig out major foundations prior to pouring the concrete slabs. Option 2 would use an auger/drill type machine for minor foundations.

In both scenarios, the limit of disturbance will be within the footprint of the substation for both the foundation equipment and the concrete delivery trucks. Topsoil will be placed at a pre-established location via techniques identified in Section 4 for future redistribution pending decommissioning.

2.3.8 Stormwater Basin Construction

Xcel Energy will install stormwater basins as needed to meet stormwater best management practice requirements per National Pollutant Discharge Elimination System (NPDES) regulations for the Project. Stormwater basins are generally sited in existing low areas that are prone to ponding during rain events. These areas will be graded and sloped to meeting design considerations with a skid steer.

2.3.9 Project Fencing Installation

The wooden posts for the agricultural fence will be augured or directly imbedded, set in place, and backfilled with the soil that was displaced by the auger, if necessary. Chain link posts around the Project substation will be spaced at approximately 10 feet on center. Corner posts will be augured 3.5 feet and embedded in concrete for structural support. All tangent posts will be direct buried 3.5 feet similar to corner posts. The Site will have man doors and gates installed, as needed.

3.0 Limitations and Suitabilities of Site Soils

Soil varies considerably in its physical and chemical characteristics that strongly influence the suitability and limitations that soil has for construction, reclamation, and restoration. Major soil properties include:

- soil texture;
- drainage and wetness;
- presence of stones, rocks, and shallow bedrock;
- fertility and topsoil characteristics; and
- soil slope.

Interpretative limitations and hazards for construction and reclamation are based to a large degree on the dominant soil properties, and include:

- prime farmland status;
- hydric soil status;
- susceptibility to wind and water erosion;
- susceptibility to compaction;
- fertility and plant nutrition; and
- drought susceptibility and revegetation potential.

3.1 Land Use Considerations

Based on an air photo history, virtually all of the Project footprint has been in irrigated agriculture starting prior to 1938. Typically, high value crops such as corn and potato rotations are grown under irrigated agriculture. Xcel Energy assumes that upon decommissioning, all surface infrastructure will be removed, and the land will be restored to agricultural use or other uses at the discretion of the landowner.

3.2 Important Soil Characteristics

The Soil Survey Geographic Database (SSURGO) is the digitized county soil survey and provides a Geographic Information System (GIS) relating soil map unit polygons to component soil characteristics and interpretations. Soil map unit polygons in the SSURGO database were clipped to the Project and internal infrastructure boundaries, including the major pieces of infrastructure:

- Fenced area hosting solar panels, racks, and arrays
- Inverter Locations
- Access Roads
- Laydown Areas
- Stormwater Basins
- Collector Substations

The acreage of major project features sharing physical properties, classifications, and limitation interpretations important for construction, use, revegetation, and reclamation were determined by spatial query of the GIS. Soils within the 3,479.5-acre Project Area but not anticipated to be affected by construction or operations are not included in the following analysis, which only includes the approximately 3,024.2 acres that will be affected by construction.

A soil map of the Sherco Project Footprint is provided along with a table of selected characteristics of site soils including physical properties, classifications, and construction-related limitations in Appendices A and B.

3.2.1 Selected Physical Characteristics: Texture, Slope, Drainage and Wetness, Topsoil Depth, Bedrock and Presence of Stones and Rocks

Selected physical characteristics of site soils are broken down by acreage with the 3,024.2-acre Project Footprint in Table 1.

Soil texture affects water infiltration and percolation, drought tolerance, compaction, rutting, and revegetation among other things. Soil texture is described by the soil textural family which indicates the range of soil particle sizes averaged for the whole soil. Most of the soils within the Project Footprint (3,012.4 acres, 99.6 percent) are in the sandy family, indicating coarse textured soils dominated by soil particles in the sand fraction (particle sizes between 0.05 and 2 mm in diameter). The remaining 11.8 acres (0.4 percent) of soils were not rated in the SSURGO database for soil texture.

Slope affects constructability, water erosion, revegetation, compaction and rutting, among other properties. Most soils (2,859.9 acres, 94.6 percent) within the Project Footprint are nearly level soils with representative slopes falling within the 0-5 percent slope range. A few soils (152.7 acres, 5 percent) have representative slopes in the >5 – 8% class. Less than one percent of soils (11.6 acres) have representative slopes in excess of 8%.

Soil drainage indicates the wetness in the soil profile along with the speed at which internal water moves. Soil Drainage affects constructability, erosion by wind and water, and revegetation success. The great majority of soils within the Project footprint are excessively drained or somewhat excessively drained (3,005.6 acres, 99 percent), indicating dry, droughty soils with very low water holding capacity. A minor amount of soils in natural swales and drainageways are wetter soils in the moderately well drained, poor and very poor drainage classes or were not rated in the SSURGO database (18.6 acres).

Topsoil depth affects soil plant nutrition and surface soil structure. To maintain soil productivity, soils with thick topsoil will require larger areas for storage of larger volume of topsoil stripped from permanent infrastructure footprints such as permanent access roads, inverters, and the Project substation. Most of the soils within the Project footprint are Mollisols and are characterized by the presence of relatively thick topsoil greater than 6-12 inches in depth (3,012.4 acres, 99.6 percent).

The presence of bedrock near the soil surface and rocks and stones in the soil profile affects constructability and revegetation. No soils in the Project Footprint are shallow to bedrock or have stones at the soil surface or within the soil profile.

Table 1: Acreage of Soils with Selected Physical Characteristics by Project Feature within the Project Footprint (Total 3,024.2 acres)

Project Feature	Total Acres[1]	Textural Family[2]		Slope Range[3]				Drainage Class[4]						Topsoil Thickness[5]			
		Sandy	NR	0-5	>5-8	>8-15	>15-30	E	SE	MW	P	VP	NR	0-6	>6-12	>12-18	NR
	Acres																
Fence Area	2,901.1	2,889.6	11.4	2,747.4	142.6	10.6	0.5	2,877.3	5.7	1.7	1.2	12.0	3.2	0.5	2,884.2	13.2	3.2
Access Roads	66.4	66.2	0.2	60.9	5.0	0.3	0.2	66.1	0.1	--	--	--	0.2	0.2	66.0	--	0.2
Inverters	0.2	0.2	--	0.2	0.0	--	--	0.2	--	--	--	--	--	--	0.2	--	--
Laydown Yards	6.6	6.6	--	6.3	0.3	--	--	6.6	--	--	--	--	--	--	6.6	--	--
Basins	18.1	17.9	0.2	13.3	4.8	0.0		17.8	--	0.2	0.1	--	--	--	18.0	0.1	--
Laydown Yards (Outside the Fence)	20.1	20.1	--	20.1	--	--	--	20.1	--	--	--	--	--	--	20.1	--	--
West Collector Substation	5.9	5.9	--	5.9	--	--	--	5.9	--	--	--	--	--	--	5.9	--	--
East Collector Substation	5.9	5.9	--	5.9	--	--	--	5.9	--	--	--	--	--	--	5.9	--	--
Total	**3,024.2**	**3,012.4**	**11.8**	**2,859.9**	**152.7**	**10.9**	**0.7**	**2,999.8**	**5.8**	**1.9**	**1.3**	**12.0**	**3.4**	**0.7**	**3,006.8**	**13.3**	**3.4**

1 Total acres of Project features that are anticipated to be disturbed by supporting construction equipment traffic, excavation, and grading. Data obtained by merging project facility polygons with the SSURGO spatial data in ArcGIS. Summations were performed in Microsoft[tm] Access.

2 Data available directly from the Natural Resources Conservation Service SSURGO2 spatial or attribute database via geospatial query of the spatial or attribute data.

3 Representative slope values are taken directly from the SSURGO database. The SSURGO2 database provides representative slope values for all component soil series. Slope classes represent the slope class grouping in percent that contains the representative slope value for a major component soil series. For example, a soil mapped in the 2-6% slope class has an average slope of 4%, which is within the 0-5% slope range.

4 Drainage class as taken directly from the SSURGO database: “E” Excessively drained; “SE” Somewhat excessively drained; “MW” Moderately well drained; “P” Poorly drained; “VP” Very poorly drained; “NR” Not rated.

5 Topsoil thickness is the aggregate thickness of the A horizons described in the SSURGO database.

3.2.2 Selected Classification Data: Prime Farmland, Land Capability Classification, Hydric Soils.

Selected classification information for site soils are broken down by acreage with the 3,024.2-acre Project Footprint in Table 2.

Natural Resources Conservation Service (NRCS)-designated prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and are also available for these uses. None of the soils in the Project Footprint are classified as Prime Farmland.

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies. 5.8 acres (less than one percent) of soils in the Project Footprint are classified as farmland of statewide importance.

Land Capability Class (LCC) is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time. Soils within the Project Footprint are in LCC 3s, 4s, 4w, 6s, 6w, 7s and 8w. A numerical value of 3 indicates soils with severe limitations that reduce the choice of plants or require very careful management; 4 indicates soils with very severe limitations that restrict the choice of plants, require very careful management or both; 6 indicates the presence of a severe limitation rendering them unsuited to cultivation; 7 indicates soils have very severe limitations that make them unsuited to cultivation and that restrict their use mainly to grazing, forestland, or wildlife; and 8 indicates soils have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for esthetic purposes. “s” indicated that the limitation is a soil characteristic, here coarse texture, and “w” indicating a wetness limitation. Most of the soils (2,840.5 acres, 94 percent) are in LCC 4s and have severe limitations due to coarse textures and drought susceptibility.

Hydric soils are generally described as soils in poorly drained to very poorly drained drainage classes. Hydric soils are formally a component of regulated wetlands and can be used to indicate areas with potential jurisdictional wetlands. Most of the soils are non-hydric (3,010.9 acres, 99 percent), with only 13.3 acres being considered hydric soils in narrow drainageways.

Table 2: Acreage of Soils with Selected Classification Data by Project Feature within the Project Footprint (Total 3,024.2 acres)												
	Total Acres[1]	Prime Farmland[2]	Farmland of Statewide Importance	Land Capability Class[2]								Hydric Soil[2]
				3s	4s	4w	6s	6w	7s	8w	NR	
Project Feature	Acres											
Fence Area	2,901.1	--	5.7	5.7	2,728.4	1.2	150.0	5.5	0.5	6.5	3.2	13.2
Access Roads	66.4	--	0.1	0.1	60.8	--	5.1	--	0.2	--	0.2	--
Inverters	0.2	--	--	--	0.2	--	0.0	--	--	--	--	--
Laydown Yards	6.6	--	--	--	6.3	--	0.3	--	--	--	--	--
Basins	18.1	--	--	--	13.2	0.1	4.8	--	--	--	--	0.1
Laydown Yards (Outside the Fence	20.1	--	--	--	20.1	--	--	--	--	--	--	--
West Collector Substation	5.9	--	--	--	5.9	--	--	--	--	--	--	--
East Collector Substation	5.9	--	--	--	5.9	--	--	--	--	--	--	--
Total	**3,024.2**	**--**	**5.8**	**5.8**	**2,840.8**	**1.3**	**160.2**	**5.5**	**0.7**	**6.5**	**3.4**	**13.3**

1 Total acres of Project features that are anticipated to be disturbed by supporting construction equipment traffic, excavation, and grading. Data obtained by merging project facility polygons with the SSURGO spatial data in ArcGIS. Summations were performed in Microsoft[tm] Access.

2 Data available directly from the NRCS SSURGO2 spatial or attribute database via geospatial query of the spatial or attribute data.

3.2.3 Construction-Related Interpretations: Highly Erodible Land (Wind and Water), Compaction Prone, Rutting Prone, and Drought Susceptible with Poor Revegetation Potential.

Selected construction-related interpretative data for site soils are broken down by acreage within the 3,024.2-acre Project Footprint in Table 3.

Highly erodible land is identified as being susceptible to water and wind erosion. The majority of soils in the Project Footprint are low relief, coarse-textured soils with rapid water infiltration characteristics that limit soil erosion by the agent of water. Less than one percent (0.7 acres) of soils in the Project Footprint are highly water erodible.

Wind erosion was evaluated using the wind erodibility group. Highly wind erodible soils are medium textured, relatively well drained soils with poor soil aggregation, resulting in soils with soil surfaces dominated by particles that can be dislodged and carried by the wind. Approximately 3,001.7 acres (99 percent) of soils within the Project area are highly wind erodible.

Soils prone to compaction and rutting are subject to dramatic and adverse changes in soil porosity and structure as a result of mechanical deformation caused loading by equipment during construction. Compaction and rutting are related to moisture content and texture and are worse when medium and fine textured soils are subject to heavy equipment traffic when wet. Compaction and rutting are not anticipated to be significant issues because the soils are coarse textured and are typically excessively drained. Only 6.5 acres of wet soils may have issues with rutting. None of the soils are particularly susceptible to compaction.

Soils susceptible to drought include coarse textured soils in moderately well to excessive drainage classes. Revegetation during seed germination and early seedling growth is severely compromised during dry periods on droughty soils. Most (3,005.6 acres, 99 percent) of the soils within the Project Footprint are susceptible to drought.

Table 3: Acreage of Soils in Selected Construction-related Interpretations by Project Feature within the Project Footprint (Total 3,024.2 acres)

Project Feature	Total Acres[1]	Highly Erodible[2]		Compaction Prone[3]	Rutting Hazard[4]			Drought Susceptible[5]
		Water	Wind		Moderate	Severe	NR	
	Acres							
Fence Area	2,901.1	0.5	2,878.9	6.5	2,891.3	6.5	3.2	2,883.0
Access Roads	66.4	0.2	66.1	--	66.2	--	0.2	66.2
Inverters	0.2	--	0.2	--	0.2	--	--	0.2
Laydown Yards	6.6	--	6.6	--	6.6	--	--	6.6
Basins	18.1	--	18.0	--	18.1	--	--	17.8
Laydown Yards (Outside the Fence)	20.1	--	20.1	--	20.1	--	--	20.1
West Collector Substation	5.9	--	5.9	--	5.9	--	--	5.9
East Collector Substation	5.9	--	5.9	--	5.9	--	--	5.9
Total	3,024.2	0.7	3,001.7	6.5	3,014.3	6.5	3.4	3,005.6

1 Total acres of Project features that are anticipated to be disturbed by supporting construction equipment traffic, excavation, and grading. Data obtained by merging solar facilities and easement polygons with the SSURGO spatial data in ArcGIS. Summations were performed in Microsoft[tm] Access.

2 Highly Erodible Water Includes soils in land capability classes 4e through 8e or that have a representative slope value greater than or equal to 9%. Highly Erodible Wind Includes soils in wind erodibility groups 1 and 2.

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

4 Rutting potential hazard based on the soil strength as indicated by engineering texture classification, drainage class, and slope. In general, soils on low slopes in wetter drainage classes, and comprised of sediments with low strength will have potential rutting hazards.

5 Includes soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained.

3.2.4 Summary of Major Soil Limitations at the Sherco Solar Project

3.2.4.1 Wind Erosion (Dust)

Soils within the Sherco Project Footprint are nearly level, deep, excessively drained, coarse-textured Mollisols. The primary limitations for the soils during construction, operations and maintenance, and decommissioning include wind erosion when dry soils lack a protective vegetative or mulch cover, potential poor revegetation due to the presence of droughty soils, and the need to reserve and store large volumes of topsoil. Wind erosion can create dust and will be managed and minimized by appropriately mulching exposed soils, wetting exposed soils to minimize dust during construction activity, and maintaining good vegetative cover (both cover crops and permanent vegetation). Initial post-construction revegetation efforts and maintenance of vegetation during operations and maintenance will need to consider selecting drought tolerant plants, managing seeding times for late spring early summer when soil moisture is optimum for germination, use of mulch and other BMPs that manage evapotranspiration, and potentially supplying water during dry periods.

3.2.4.2 Topsoil Storage

Topsoils are thick ranging from 6 to greater than 18 inches but are not extremely high in organic matter. These soils may have issues with fertility, requiring occasional fertilizer amendments to maintain robust plant growth. Storing topsoil in relatively sterile, large piles that are not active plant growth media is not recommended as the storage conditions may adversely influence soil flora and fauna affecting soil quality when topsoils are restored to areas from which the topsoil was taken. To the extent practicable, topsoil should be conserved by preselecting areas to receive excess topsoil from nearby areas, grading and seed bed preparation as appropriate, and revegetation to maintain a rhizosphere suitable for plant growth.

3.2.4.3 Compaction

While compaction and rutting may not be significant limitations, Xcel Energy will design construction access and manage construction passes to minimize the number of trips occurring on a given soil and will implement wet weather procedures any time that rutting is observed. Deep compaction is not anticipated to be a significant problem as the number of construction equipment passes over a given area is limited, and construction equipment consists of smaller, low-ground-pressure tracked vehicles.

4.0 BMPs During Construction and Operation

The Project will be constructed and operated on property owned by Xcel Energy. As stated above, the Project is located on irrigated farmland occupying a flat to gently rolling sandy glacial terrace above the current floodplain of the Mississippi River in central Minnesota. None of the farmland within the Project Footprint is considered prime farmland and less than one percent (5.8 acres) are considered farmland of statewide importance.

Because all construction activities will be limited to land owned by Xcel Energy, no direct impacts to adjacent land are expected. Additionally, the technology to be deployed at this facility does not require that the entire Project Footprint be completely flat or a uniform grade. Because most of the site is currently nearly level or has slightly rolling terrain (Table 1), the amount of grading anticipated within the Project Footprint is expected to be minimal. The PV arrays can be designed to follow the existing grade of the site within certain tolerances, which allows the designer of the facility to minimize the amount of earthmoving activities that are required.

While some grading activities may be required to raise or lower certain areas within the Project Footprint, the majority of the Project Footprint's topography would be left unchanged. The remainder of earthmoving activities would consist of work on the interior access roads, trenches for the DC and AC collection system, and foundational work for the Project substation and inverter skids as necessary. The sections below describe the measures that the Contractor will implement to minimize the physical impacts to the integrity of the topsoils and topography of the Site.

4.1 Environmental Monitor

Xcel Energy will engage an onsite monitor for earthmoving activities during the initial phase of Project construction to ensure appropriate measures are taken to properly segregate and handle the topsoils. The Monitor will have a variety of duties, including but not limited to:

- Perform regular inspections during the major earthmoving phase of Project construction;
- Observe construction crews and activities to ensure that topsoil is being segregated and managed appropriately;
- Monitor the site for areas of potential soil compaction (except within access roads) and make specific recommendations for decompaction;
- Make recommendations to Xcel Energy'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 reports of Xcel Energy's adherence to soil BMPs to MDA during the major earthmoving phase of Project construction and upon completion of earthmoving activities.

Potential issues with BMPs will be reported directly to Xcel Energy's construction manager who will use discretion to either correct the activity or stop work.

4.2 Soil Segregation and Decompaction

During construction, one of the primary means to protect and preserve the valuable topsoil at the Project Footprint will be to separate the topsoil from the other subgrade/subsoil materials when earthmoving activities or excavation are taking place during grading, road construction, cable installation, foundation installation, etc. There may be limited situations where excavated subsoil must be stored on adjacent undisturbed topsoil. In these situations, subsoil will be returned to the excavation with as little disturbance of the underlying topsoil as practicable. Laying down a thin straw mulch layer as a buffer between the subsoil and topsoil may be used to facilitate more effective separation of the subsoil and underlying topsoil during the excavation backfill process.

Based on SSURGO data, topsoil thickness in the Project Footprint is typically between 6-12 inches. This will be confirmed with tests by a Minnesota Licensed Professional Soil Scientist prior to earthwork activities on the site. Xcel Energy will work with the soil scientist to identify the appropriate depth of topsoil that should be stripped and segregated from other subsoil materials during earthwork activities. Xcel Energy will provide this information and a recommendation on specific segregation methods/techniques to the Monitor for review and input. As an interim recommendation Xcel Energy suggests that the full depth of topsoil be stripped up to 12 inches in thickness. Topsoil greater than 12 inches from the soil surface would be treated similarly to the underlying subsoil. During the activities that require temporary excavations and backfilling (i.e., trenching activities) the subgrade material will be replaced into the excavations first and compacted as necessary, followed by replacement of topsoil to the approximate locations from which it was removed. Topsoil will then be graded to the approximate pre-construction contour. Xcel Energy will strive to avoid compaction in other areas where it is not required by the design. Following earthwork activities that require segregation of topsoils/subsoils, topsoil materials will be re-spread on top of the backfilled and disturbed areas to maintain the overall integrity and character of the pre-construction farmland. Any excess topsoil material would be re-spread on the Project Footprint at pre-established locations on the site. The location and amount of topsoil will be documented to facilitate re-spreading of topsoil after decommissioning. This practice is described in more detail below for each of the earthmoving activities that are anticipated for this Project.

Stripped topsoil that will be necessary for future reclamation for components such as access road installation and collector substation construction will be removed to suitable locations near the site of removal and spread across existing topsoil for storage. Storage locations will be identified (Global Positioning System [GPS] boundary and depth) and recorded on site maps to facilitate final reclamation after decommissioning.

4.3 Wet Weather Conditions

During the construction of the Project, it is likely that there will be periods of wet weather that may necessitate a temporary halt of construction activities. The Xcel Energy Construction Manager will have responsibility for halting activities if weather conditions pose a risk to worker safety or if conditions are such that heavy equipment would cause severe rutting of the Project Footprint. Following initial grading at the Site, many activities could still proceed in wet weather given the lack of heavy equipment required for those tasks and the coarse textured, excessively drained nature of the major of site soils. However, Xcel Energy’s Construction Manager would be responsible for ensuring that topsoil erosion, rutting, compaction, or damage to drain tiles (if present) is avoided or minimized to the extent possible. Because compaction of soils can become problematic during wet weather conditions, as stated above, the Construction Manager will work with the Monitor to ensure that techniques/practices are employed to decompact soils appropriately following wet weather conditions. Decompaction with chisel plows prior to disking and planting will typically be a standard method of soil preparation in areas proposed for seeding to native grasses, forbs, and pollinator species. Agricultural equipment capable of operating within the approximate 16-foot wide area between PV Panel lines when panes are oriented vertically would be used to decompact, prepare a seedbed, and plant suited seed mixes.

4.4 Adaptive Management During Construction

Should weather or site conditions during construction require different BMPs than those that are described in this section, Xcel Energy will work with the Monitor to discuss potential new approaches to the specific conditions that are encountered. Any modifications to strategies would be outlined in reports to the MDA.

Xcel Energy will remain flexible and implement new practices/procedures that will help ensure the quality of the land while maintaining the safety of the workers.

4.5 Initial Grading/Road Construction/Array Construction

The first phase of Project construction will be the general civil works at the Project Footprint where all major cut and fill activities will be performed by the Contractor. As stated above, Xcel Energy will consult with a qualified soil scientist to identify the appropriate depth of topsoil up to 12 inches that should be stripped and segregated from other materials during initial grading activities. .

The Contractor will first strip topsoil around the few selected hills/valleys on site. This will ensure that the topography falls within the tolerances allowed for by the solar array design. During this civil work, topsoil will be pushed outside of the cut/fill areas and collected into designated spots for later use. Once topsoil is removed from the cut/fill areas, the sub-grade materials will be removed as required from on-site hills and relocated to on-site low spots. Prior to relocating sub-grade materials to the low spots, topsoil in the low areas will be stripped and set aside before the fill is added, then respreads over the new fill. The sub-grade materials would be compacted in place. When compaction is complete, the topsoil spoil piles will be re-spread over the reconditioned sub-grade areas.

This newly spread topsoil will be loosely compacted and/or “tracked” and employ the wind and stormwater erosion prevention BMPs described below in Section 4.8.

After the majority of the major earthwork activities have been completed, the Contractor will start construction of the internal road network. This work would start with the stripping of topsoil materials from the roadbeds to a depth of at least 12 inches. Topsoil will be windrowed to the edges of each roadbed. Windrowing will consist of pushing materials into rows of spoil piles adjacent to the road which will be loosely compacted and/or “tracked” with stormwater and wind erosion BMPs in place. The Contractor will then compact the sub-grade materials. After gravel is installed and compacted to engineers’ requirements, the Contractor will shape Project drainage ditches as identified on the final grading plan. Finally, the previously stripped and windrowed topsoil material will be re-spread throughout the Project Footprint.

Once grading and road construction is complete, the Contractor can begin the installation of foundation piles for the PV array racking system. This work will consist of directly driving the pile into the soil with pile hammers. These vehicles would operate on the existing surface of the ground and impacts would be limited to what is typical when vehicles drive over the soil surface. Very little soil disturbance is expected from this activity.

4.6 Foundations

The Contractor will also perform foundation work for the Project substation and inverters. For the substation, the Contractor will strip topsoil off the substation area, install the pier-type foundations, compact sub-grade materials, re-grade spoils around the substation yard, and then install clean washed rock on the surface. All topsoil stripped from the substation area will be pushed outside of the substation area and collected into designated spots for later use. These topsoil piles will be windrowed or piled and loosely compacted and/or "tracked" with stormwater and wind erosion BMPs in place. Once substation construction is advanced, the topsoil piles would be distributed in a thin layer adjacent to the substation area.

For the inverters, topsoil will again be stripped and placed adjacent to the inverter. Afterwards, the foundations will be dug using a rubber-tire backhoe and then rebar and concrete installed and left to cure. After cure and testing of concrete strength is completed, the subgrade spoils will be compacted around the inverters. After the inverter is set, the adjacent topsoil will be re-spread around the inverter.

4.7 Trenching

Construction of the Project may require trenching for the installation of both DC and AC collection lines across the Project Area. If the collection lines are buried, the Contractor will be installing AC and DC collection cables in trenches of 4 feet deep using the "open trench" method. Topsoil and subgrade materials would be excavated from the trench using typical excavating equipment or backhoes and segregated as described above. The bottom of each trench may be lined with clean fill to surround the cables. Xcel Energy anticipates that native subsoil will be rock free (Table 1), and that no foreign fill will be necessary. After cables have been installed on top of bedding materials in the trench, 1 foot of screened, native backfill will be placed on the cables followed by additional 2 feet of unscreened native backfill trench spoil. This material would be compacted as necessary. The last 1 foot of each trench will then be backfilled with topsoil material only to return the surface to its finished grade.

4.8 Temporary Erosion and Sediment Control

Xcel Energy will prevent excessive soil erosion on lands disturbed by construction by adhering to a SWPPP required under the NPDES permitting requirement that will be administered by the Minnesota Pollution Control Agency.

Prior to construction, Xcel Energy will work with engineers or the construction contractor to outline the reasonable methods for erosion control and prepare the SWPPP.

These measures would primarily include silt fencing on the downside of all hills and near waterways. This silt fencing would control soil erosion via stormwater. Check dams and straw waddles will also be used to slow water during rain events in areas that have the potential for high volume flow. In addition, the Contractor can use erosion control blankets on any steep slopes, although given the site topography, this BMP will not likely be required. Lastly, as outlined above, topsoil and sub-grade material will be piled and loosely compacted and / or "tracked" while stored. The BMPs employed to mitigate wind and stormwater erosion on these soil stockpiles will include installing silt fence on the downward side of the piles as needed and installation of straw waddles if these spoil piles are located near waterways.

The SWPPP will designate onsite SWPPP inspectors to be employed by the Contractor for routine inspections as well as for inspections after storm events per the plan outlined in the SWPPP.

4.9 Drain Tile Identification, Avoidance and Repair

Based on information collected to date, and correspondence with participating landowners, Xcel Energy does not anticipate drain tile to be present within the Project Footprint. If any drain tile is located, and in an effort to minimize any unforeseen repairs or damages to existing drain tile and/or drain tile systems, Xcel Energy will follow established procedures to address the presence and treatment of this tile before, during, and after construction, including:

- pre-construction tile mapping from landowner maps, infrared aerial photography, and other sources;
- Project design considerations;
- construction mitigation measures; and
- repair/remediation of damaged tile.

4.10 Center-Pivot Irrigation Well Identification and Avoidance

Center-pivot irrigation systems are present within the Solar Project Area. Center-Pivot systems and the water/utility lines servicing them within the Project Footprint will be decommissioned and left in place. Any wells noted in the Project Footprint will either be marked with flagging and a five-foot buffer around them fenced so as to avoid impacting these structures, or fully decommissioned. If Xcel Energy identifies a need for wells during operations, these wells may be uncapped or new wells may be installed.

5.0 Decommissioning

At the end of the Project's useful life, anticipated to be 35 years, Xcel Energy will either take necessary steps to continue operation of the Project (such as re-permitting and retrofitting) or will decommission the Project and remove facilities. Xcel Energy reserves the right to extend operations instead of decommissioning at the end of the site permit term. Refer to the Project's Decommissioning Plan for additional details.

5.1 Restoration/Reclamation of Facility Site

After all equipment is removed, the facility would be restored to an agricultural use, in accordance with the Decommissioning Plan, or to another use if the economic conditions and landowner intentions at that time indicate another use is appropriate for the site. Holes created by steel pier foundations and fence poles, concrete pads, re-claimed access road corridors and other equipment will be filled in with either stockpiled soil locations or via supplemented soil to pre-construction conditions. Grading and other soil disturbance activities during decommissioning will be kept to the minimum necessary to effectively decommission the site and to maintain the soil benefits realized during the long-term operation of the Project. As noted in the Decommissioning Plan, disturbed soils will be decompacted to further prepare the site for agricultural use.

Figures

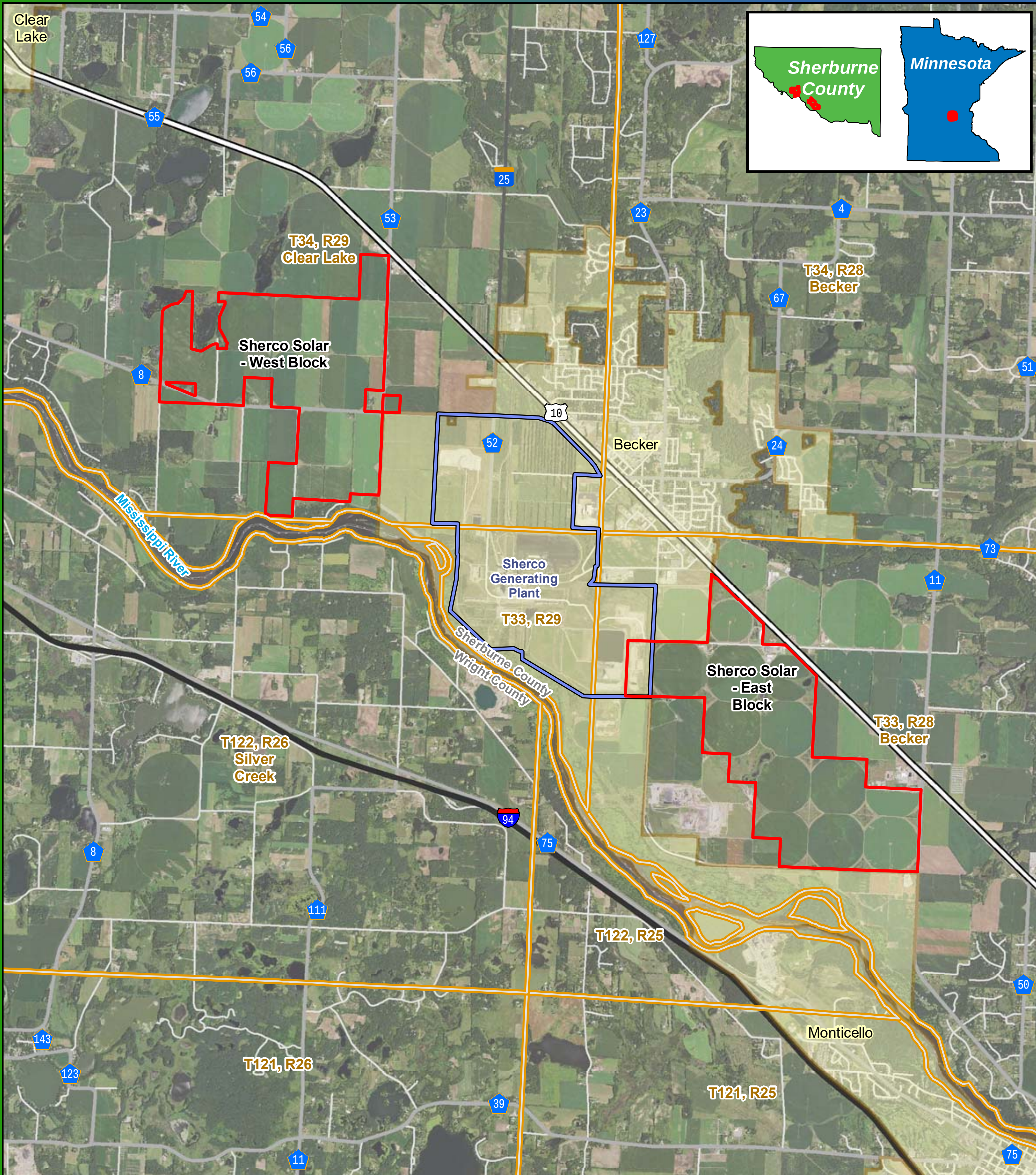

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Figure 1
Solar Project Location
Sherco Solar Project
Sherburne County, MN

- Solar Project Area
- Sherco Generating Plant
- City/Town
- PLSS Township

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brian.schreurs Date: 4/13/2021

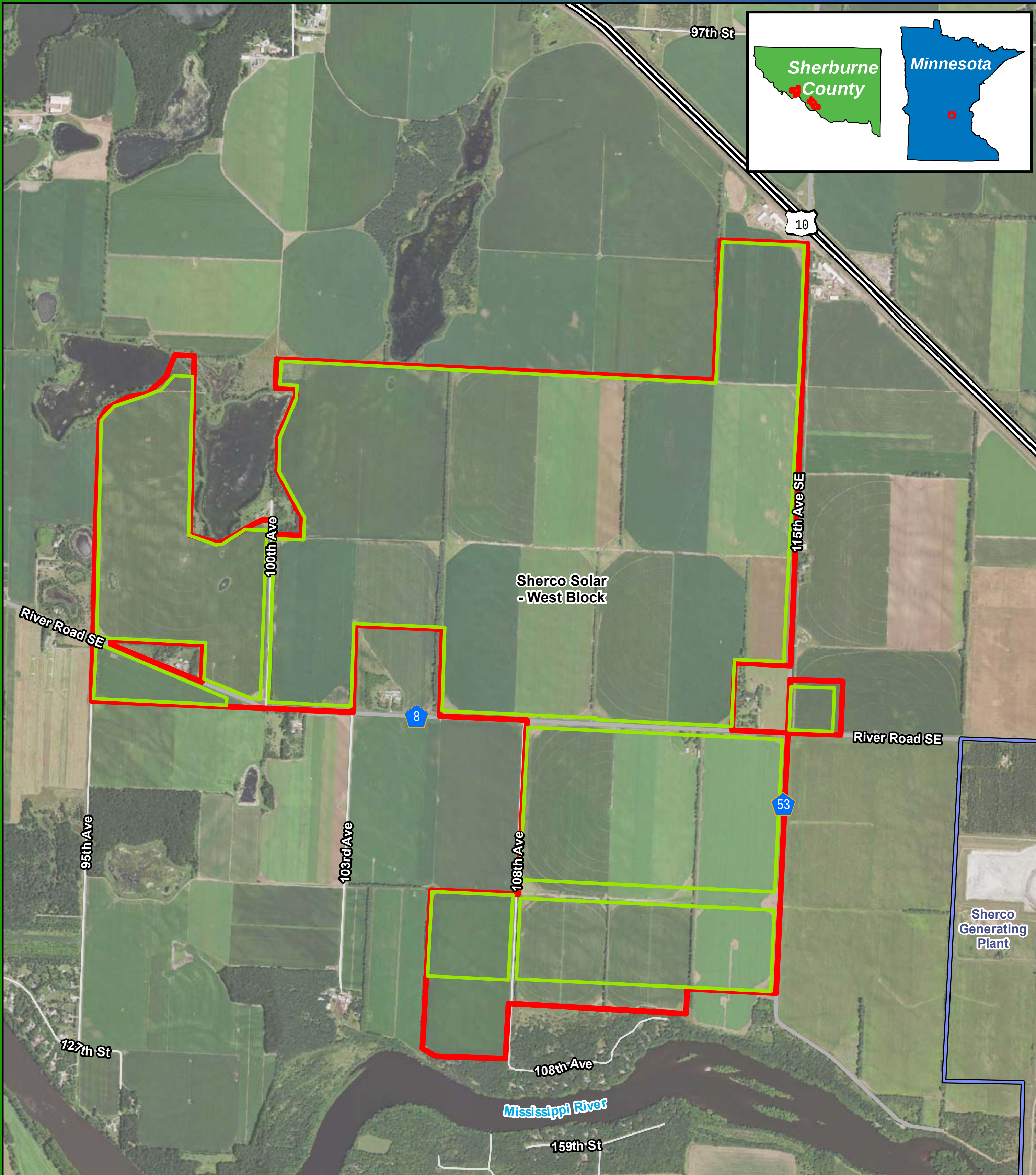

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Figure 2a
Solar Project Area and Solar Project Footprint (West Block)
Sherco Solar Project
Sherburne County, MN

Solar Project Area
Solar Project Footprint
Sherco Generating Plant

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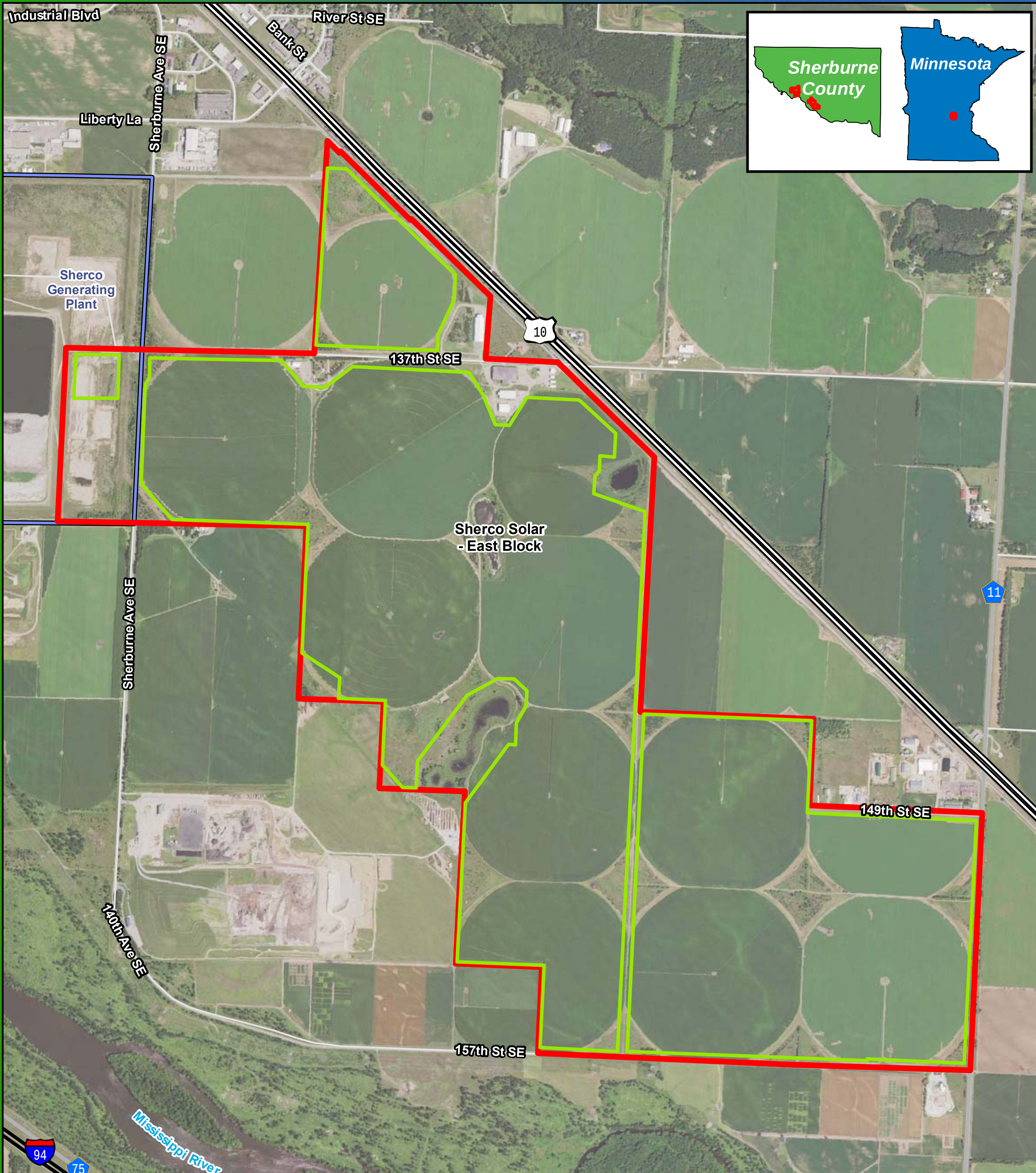

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Figure 2b
Solar Project Area and Solar Project Footprint (East Block)
Sherco Solar Project
Sherburne County, MN

- Solar Project Area
- Solar Project Footprint
- Sherco Generating Plant

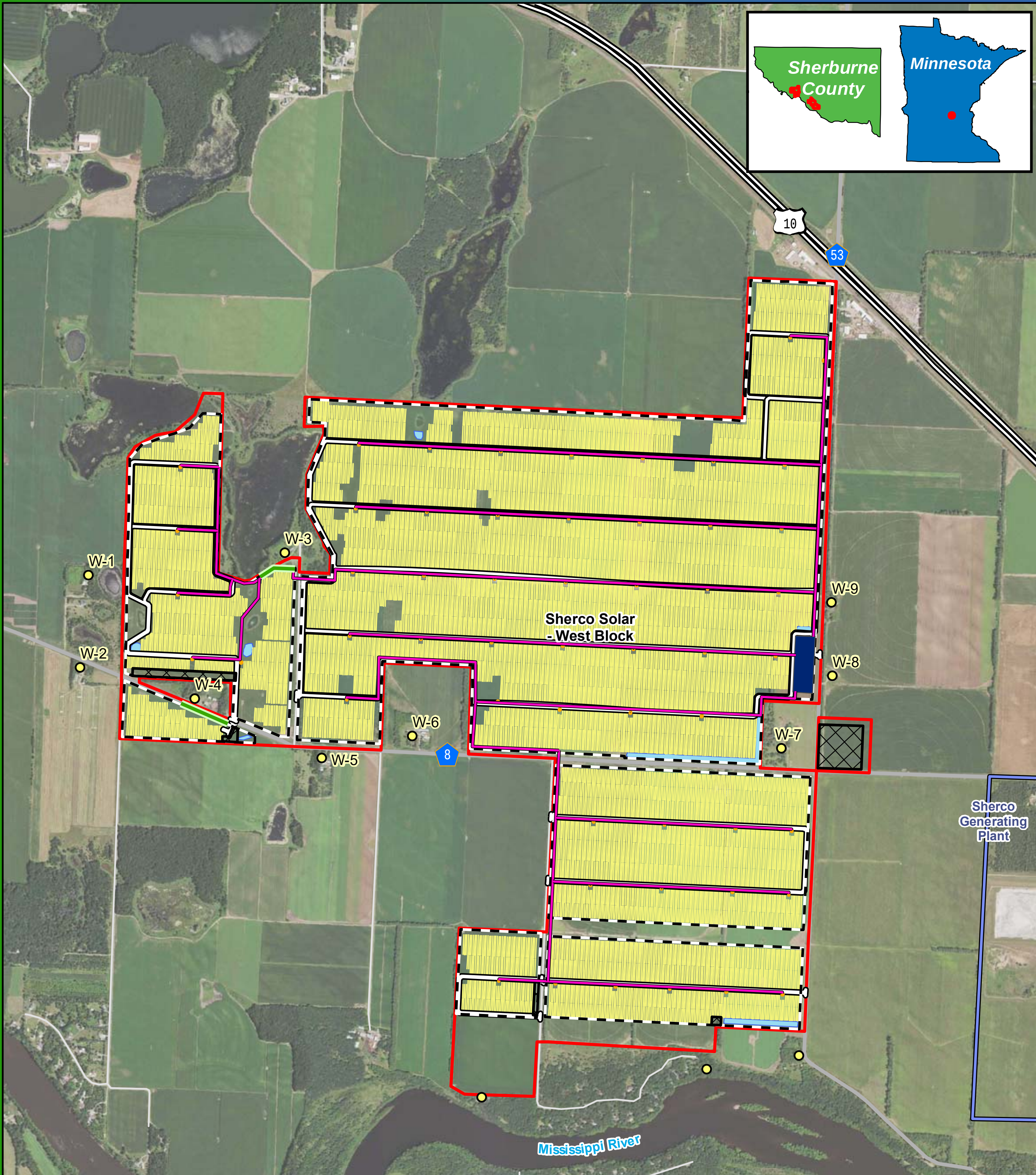

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Figure 3a
Preliminary Project Layout (West Block)
Sherco Solar Project
Sherburne County, MN

- Adjacent Residence
- Solar Project
- Access Road
- Vegetation Screening
- Collection Line
- Inverter
- West Collector Substation
- Laydown Area
- Security Fence
- Solar Array
- Drainage Basin
- Sherco Generating Plant

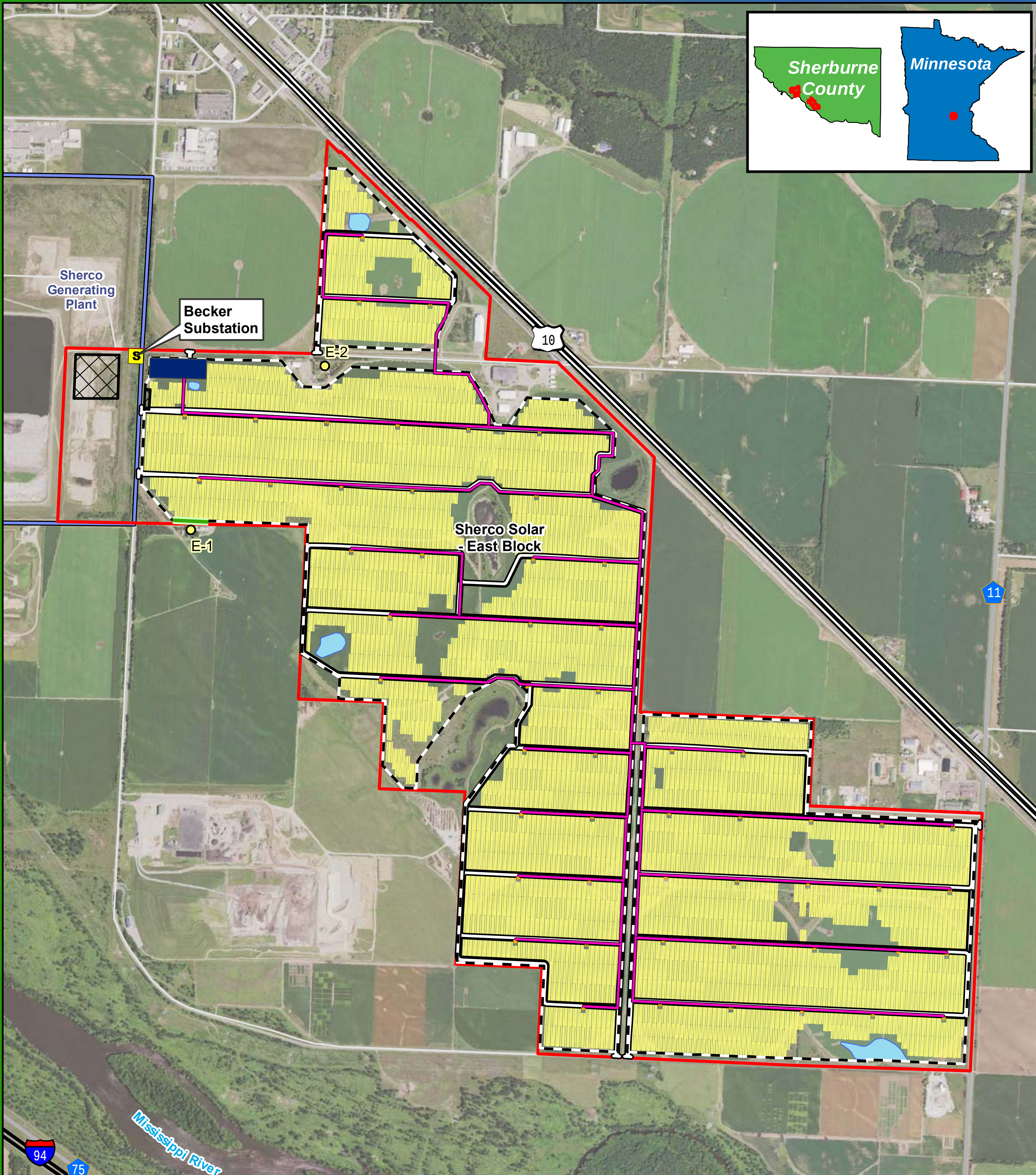

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Figure 3b
Preliminary Project Layout (East Block)
Sherco Solar Project
Sherburne County, MN

- Adjacent Residence
- Existing Substation
- Solar Project Area
- Access Road
- Vegetation Screening
- Collection Line
- Inverter
- West Collector Substation
- Laydown Area
- Security Fence
- Solar Array
- Drainage Basin
- Sherco Generating Plant

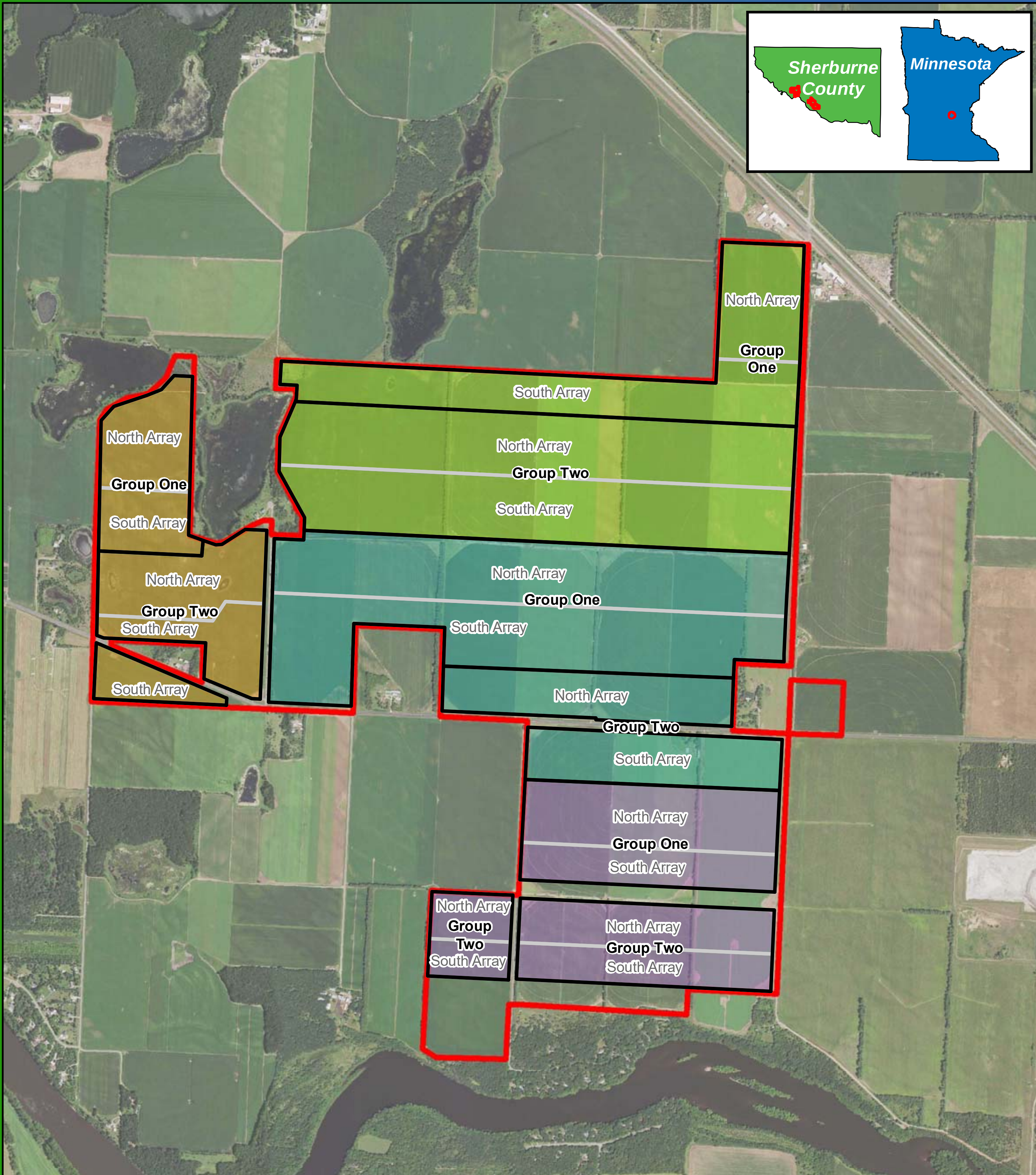

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Figure 4a
Configuration of Project Components (West Block)
Sherco Solar Project
Sherburne County, MN

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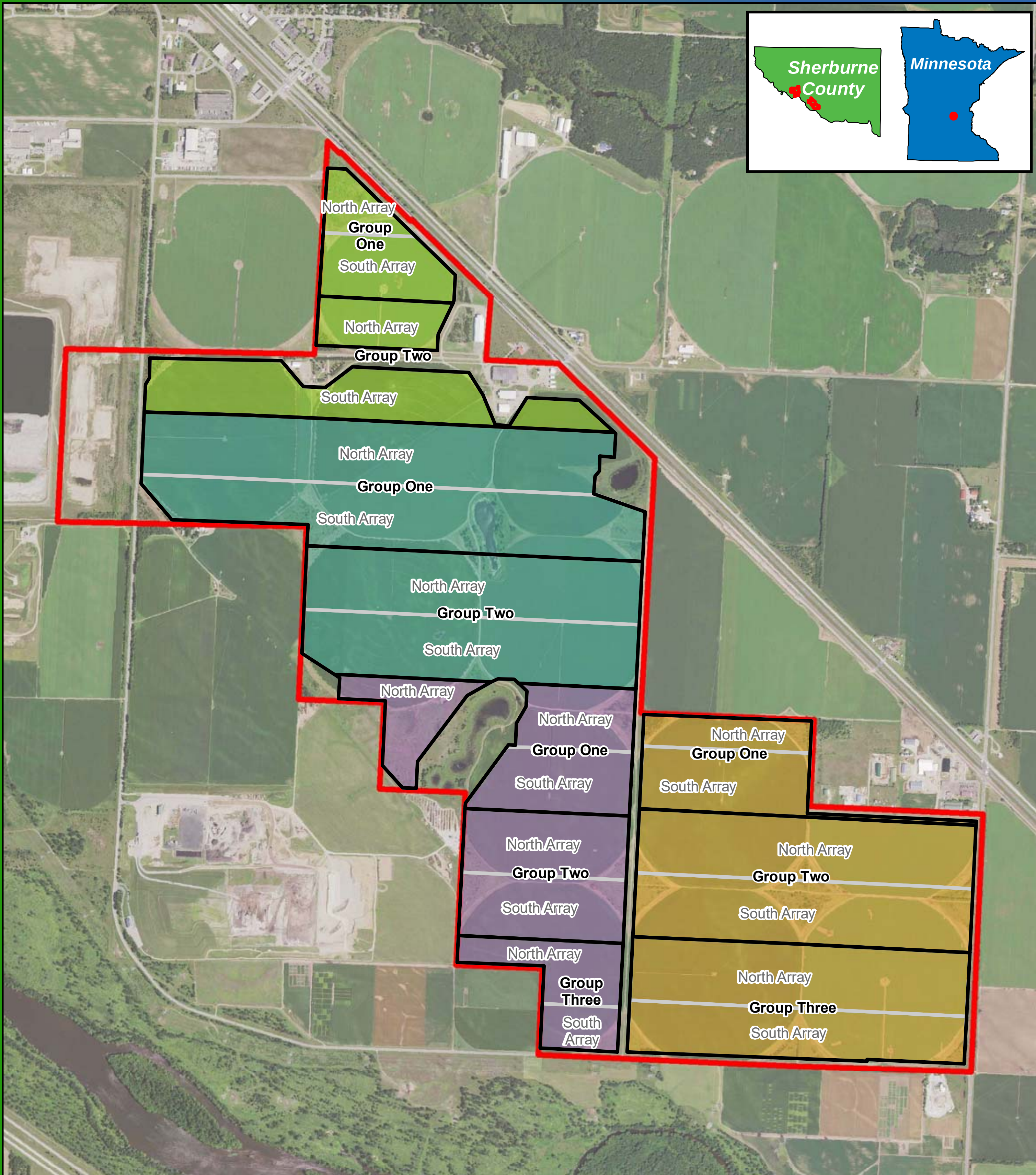

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Figure 4b
Configuration of Project Components (East Block)
Sherco Solar Project
Sherburne County, MN

- Solar Project Area
- East Unit
- Middle Unit
- North Unit
- South Unit

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Appendix A

Selected Soil Physical Features, Classifications, and Interpretations and Limitations

Appendix A: Selected Soil Physical Features, Classifications, and Interpretations and Limitations

Feature Type[1]	Acres[2]	Map Unit Symbol[3]	Map Unit Name[3]	Selected Soil Physical Features: Particle Size Family[3]	Selected Soil Physical Features: Slope Range[4]	Selected Soil Physical Features: Drainage Class[5]	Selected Soil Physical Features: Topsoil Thickness[6]	Selected Soil Physical Features: Shallow Bedrock/ Stony and Rocky[7]	Selected Soil Classifications: Prime Farmland[3]	Selected Soil Classifications: Land Capability Classification[3]	Selected Soil Classifications: Hydric Soil Rating[3]	Construction/Reclamation Interpretations and Limitations: Highly Erodible Water[8]	Construction/Reclamation Interpretations and Limitations: Highly Erodible Wind[9]	Construction/Reclamation Interpretations and Limitations: Compaction Prone[10]	Construction/Reclamation Interpretations and Limitations: Rutting Potential[11]	Construction/Reclamation Interpretations and Limitations: Droughty[12]
Project Area	338.9	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	43.2	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	24.0	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	13.8	261	Isan sandy loam, depressional, 0 to 1 percent slopes	sandy	0-5	Very poorly drained	>12-18	No	Not prime farmland	6w	Yes	No	No	No	Moderate	No
	10.0	258B	Sandberg loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	9.7	1288	Seelyeville-Markey complex, ponded, 0 to 1 percent slopes	not used	0-5	Very poorly drained	>12-18	No	Not prime farmland	8w	Yes	No	No	Yes	Severe	No
	8.3	1223	Sandberg-Arvilla complex, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	2.8	260	Duelm loamy sand, 0 to 2 percent slopes	sandy	0-5	Moderately well drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	No
	2.4	258E	Sandberg loamy coarse sand, 6 to 30 percent slopes	sandy	>15-30	Excessively drained	0-6	No	Not prime farmland	7s	No	Yes	Yes	No	Moderate	Yes
	1.0	258C	Sandberg loamy sand, 2 to 12 percent slopes	sandy	>8-15	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	0.7	D67A	Hubbard loamy sand, 0 to 2 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.2	1028	Udorthents-Pits, gravel, complex	Not rated	>5-8	Not rated	Not rated	Not rated	Not prime farmland	Not rated	No	Not rated	No	Not rated	Not rated	Not rated
	0.2	708	Rushlake coarse sand, 1 to 4 percent slopes	not used	0-5	Moderately well drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	No
Fence Area	2,496.4	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	143.2	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	139.4	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	50.4	D67A	Hubbard loamy sand, 0 to 2 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	36.0	258B	Sandberg loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	10.6	258C	Sandberg loamy sand, 2 to 12 percent slopes	sandy	>8-15	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	6.5	1288	Seelyeville-Markey complex, ponded, 0 to 1 percent slopes	not used	0-5	Very poorly drained	>12-18	No	Not prime farmland	8w	Yes	No	No	Yes	Severe	No
	5.7	768	Mosford sandy loam, 0 to 2 percent slopes	sandy	0-5	Somewhat excessively drained	>6-12	No	Farmland of statewide importance	3s	No	No	No	No	Moderate	Yes
	5.5	261	Isan sandy loam, depressional, 0 to 1 percent slopes	sandy	0-5	Very poorly drained	>12-18	No	Not prime farmland	6w	Yes	No	No	No	Moderate	No
	3.2	1028	Udorthents-Pits, gravel, complex	Not rated	>5-8	Not rated	Not rated	Not rated	Not prime farmland	Not rated	No	Not rated	No	Not rated	Not rated	Not rated
	1.7	708	Rushlake coarse sand, 1 to 4 percent slopes	not used	0-5	Moderately well drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	No
	1.2	D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	sandy	0-5	Poorly drained	>12-18	No	Not prime farmland	4w	Yes	No	No	No	Moderate	No
	0.7	1223	Sandberg-Arvilla complex, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.5	258E	Sandberg loamy coarse sand, 6 to 30 percent slopes	sandy	>15-30	Excessively drained	0-6	No	Not prime farmland	7s	No	Yes	Yes	No	Moderate	Yes
Inverters	0.2	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.0	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes

Appendix A: Selected Soil Physical Features, Classifications, and Interpretations and Limitations

				Selected Soil Physical Features					Selected Soil Classifications			Construction/Reclamation Interpretations and Limitations				
Feature Type[1]	Acres[2]	Map Unit Symbol[3]	Map Unit Name[3]	Particle Size Family[3]	Slope Range[4]	Drainage Class[5]	Topsoil Thickness[6]	Shallow Bedrock/ Stony and Rocky[7]	Prime Farmland[3]	Land Capability Classification[3]	Hydric Soil Rating[3]	Highly Erodible Water[8]	Highly Erodible Wind[9]	Compaction Prone[10]	Rutting Potential[11]	Droughty[12]
	0.0	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.0	258B	Sandberg loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.0	D67A	Hubbard loamy sand, 0 to 2 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
Access Road	54.4	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	4.8	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	3.7	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	1.4	258B	Sandberg loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	1.2	D67A	Hubbard loamy sand, 0 to 2 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.3	258C	Sandberg loamy sand, 2 to 12 percent slopes	sandy	>8-15	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	0.2	1028	Udorthents-Pits, gravel, complex	Not rated	>5-8	Not rated	Not rated	Not rated	Not prime farmland	Not rated	No	Not rated	No	Not rated	Not rated	Not rated
	0.2	258E	Sandberg loamy coarse sand, 6 to 30 percent slopes	sandy	>15-30	Excessively drained	0-6	No	Not prime farmland	7s	No	Yes	Yes	No	Moderate	Yes
	0.1	1223	Sandberg-Arvilla complex, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.1	768	Mosford sandy loam, 0 to 2 percent slopes	sandy	0-5	Somewhat excessively drained	>6-12	No	Farmland of statewide importance	3s	No	No	No	No	Moderate	Yes
Laydown	6.3	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.3	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
Basin	11.2	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	4.8	D67C	Hubbard loamy sand, 2 to 12 percent slopes	sandy	>5-8	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
	1.8	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.2	708	Rushlake coarse sand, 1 to 4 percent slopes	not used	0-5	Moderately well drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	No
	0.1	D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	sandy	0-5	Poorly drained	>12-18	No	Not prime farmland	4w	Yes	No	No	No	Moderate	No
	0.0	258C	Sandberg loamy sand, 2 to 12 percent slopes	sandy	>8-15	Excessively drained	>6-12	No	Not prime farmland	6s	No	No	Yes	No	Moderate	Yes
Laydown (Outside the Fence)	20.1	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
West Collector Substation	5.9	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
East Collector Substation	5.2	D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes
	0.7	D67B	Hubbard loamy sand, 1 to 6 percent slopes	sandy	0-5	Excessively drained	>6-12	No	Not prime farmland	4s	No	No	Yes	No	Moderate	Yes

1 Project Area include soils under lease for the Sherco Solar Project but that are not anticipated to be disturbed during construction or operations.
2 Data obtained by merging Feature Type polygons with the SSURGO spatial data in ArcGIS. Summations were performed in Microsoft[tm] Access.
3 Obtained directly by query of the SSURGO geospatial database.
4 Representative slope values are taken directly from the SSURGO database. The SSURGO2 database provides representative slope values for all component soil series. Slope classes represent the slope class grouping in percent that contains the representative slope value for a major component soil series. For example, a soil mapped in the 2-6% slope class has an average slope of 4%, which is within the 0-5% slope range.

Appendix A: Selected Soil Physical Features, Classifications, and Interpretations and Limitations

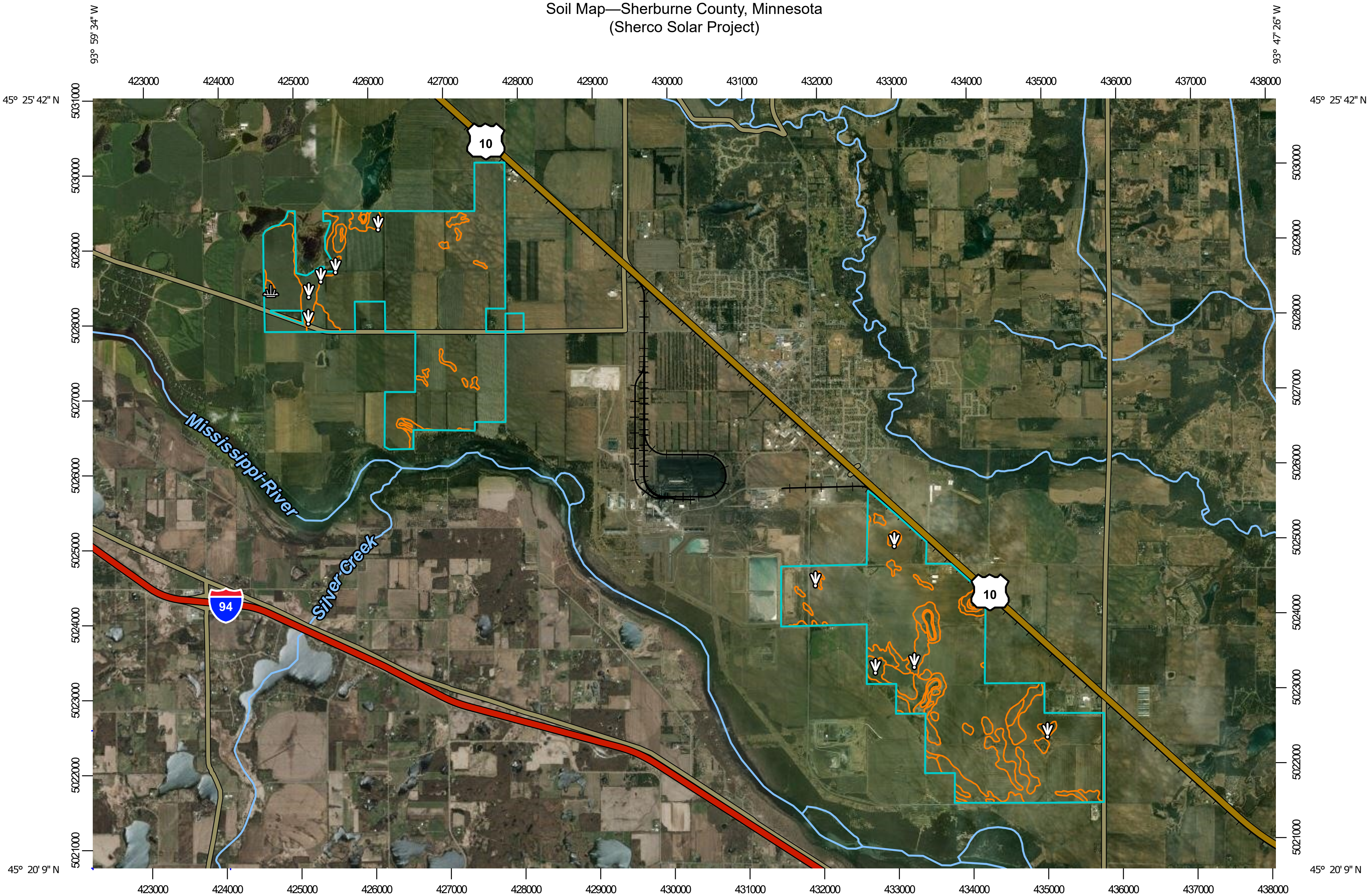
				Selected Soil Physical Features					Selected Soil Classifications			Construction/Reclamation Interpretations and Limitations				
Feature Type[1]	Acres[2]	Map Unit Symbol[3]	Map Unit Name[3]	Particle Size Family[3]	Slope Range[4]	Drainage Class[5]	Topsoil Thickness[6]	Shallow Bedrock/ Stony and Rocky[7]	Prime Farmland[3]	Land Capability Classification[3]	Hydric Soil Rating[3]	Highly Erodible Water[8]	Highly Erodible Wind[9]	Compaction Prone[10]	Rutting Potential[11]	Droughty[12]

5 Drainage class as taken directly from the SSURGO database. ED, PD, and VPD indicate Excessively Drained, Poorly Drained, and Very Poorly Drained soils, respectively.
6 Topsoil thickness is the aggregate thickness of the A horizons described in the SSURGO database.
7 Shallow Bedrock taken directly from the SSURGO database. Stony/Rocky soils are those soils that have either a cobbley, stony, boulder, shaly, very gravelly or extremely gravelly modifier to the textural class of the surface layer or that have a surface layer with > 5% stones or rocks > 3 inches in any dimension.
8 Includes soils in land capability classes 4e through 8e or that have a representative slope value greater than or equal to 9%.
9 Includes soils in wind erodibility groups 1 and 2.
10 Includes soils that are somewhat poorly drained to very poorly drained soils in loamy sands and finer textural classes.
11 Rutting potential hazard based on the soil strength as indicated by engineering texture classification, drainage class, and slope. In general, soils on low slopes in wetter drainage classes, and comprised of sediments with low strength will have potential rutting hazards.
12 Includes soils with a surface texture of sandy loam or coarser that are moderately well to excessively drained.

Appendix B

NRCS Soil Map for the Sherco Solar Project

Soil Map—Sherburne County, Minnesota
(Sherco Solar Project)



Map Scale: 1:72,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 1000, 2000, 4000, 6000

Feet: 0, 3500, 7000, 14000, 21000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sherburne County, Minnesota
Survey Area Data: Version 18, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2014—May 4, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
258B	Sandberg loamy sand, 1 to 6 percent slopes	47.5	1.4%
258C	Sandberg loamy sand, 2 to 12 percent slopes	11.9	0.3%
258E	Sandberg loamy coarse sand, 6 to 30 percent slopes	3.0	0.1%
260	Duelm loamy sand, 0 to 2 percent slopes	2.8	0.1%
261	Isan sandy loam, depressional, 0 to 1 percent slopes	19.3	0.6%
708	Rushlake coarse sand, 1 to 4 percent slopes	2.1	0.1%
768	Mosford sandy loam, 0 to 2 percent slopes	5.8	0.2%
1028	Udorthents-Pits, gravel, complex	3.7	0.1%
1223	Sandberg-Arvilla complex, 0 to 3 percent slopes	9.1	0.3%
1288	Seelyeville-Markey complex, ponded, 0 to 1 percent slopes	16.3	0.5%
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	1.3	0.0%
D62A	Hubbard-Mosford complex, Mississippi River Valley, 0 to 3 percent slopes	2,940.5	84.5%
D67A	Hubbard loamy sand, 0 to 2 percent slopes	52.4	1.5%
D67B	Hubbard loamy sand, 1 to 6 percent slopes	173.5	5.0%
D67C	Hubbard loamy sand, 2 to 12 percent slopes	192.6	5.5%
Totals for Area of Interest		**3,481.8**	**100.0%**