APPENDIX C

Agricultural Impact Mitigation Plan

Regal Solar, LLC

Benton County, MN

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ABBREVIATIONS & DEFINITIONS

AC	alternating current
BMPs	Best Management Practices
Contractor	construction contractor
DC	direct current
Decompaction	Treatment which relieves soil compaction by introducing air space into the soil.
Drain Tile	Typically below-ground system that removes excess water from the soil.
GPS	global positioning system
kV	kilovolt
Regal Solar	Regal Solar, LLC / Permittee
MDA	Minnesota Department of Agriculture
MN DNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MW	megawatt
NEC	National Electric Code
NPDES	National Pollutant Discharge Elimination System
NSP	Northern States Power
Restoration contractor	Prairie restoration contractor
Project/Project Site/	
Project Area	Regal Solar Energy Project
PV	photovoltaic
SWPPP	Storm Water Pollution Prevention Plan

1.0 Purpose and Applicability of Plan

The objective of this Agricultural Impact Mitigation and Vegetation Management Plan (the Plan or AIMP) is to identify measures that Regal Solar, LLC (Regal Solar) 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 Regal Solar Project (Project). Although Regal Solar will own the property on which the Project is constructed, and would cease agricultural production on the land 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 Regal Solar 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.

Regal Solar consulted with the Minnesota Department of Agriculture (MDA) in April 2019 to discuss the AIMP's contents and site-specific characteristics. MDA also reviewed and commented on draft versions of the AIMP. The Plan presented here incorporates agency feedback on the draft version of the Plan

The strategy outlined in this Plan consists of creating a native prairie habitat within the footprint of the solar project while the Project is in operation. Typically, a solar site has a shorter prairie mix within the panel footprint, taller prairie plantings in the open space between the fence and array, and a wet seed mix for any wetlands or areas anticipated to hold water. The mixes are designed to be native and are developed with prairie specialists in coordination with the Minnesota Department of Natural Resources (MN DNR) to design a mix that will achieve Regal's goals for operating the solar facility, promote pollinator habitat, establish stable ground cover successfully, reduce erosion, reduce runoff, and improve infiltration. MN DNR has reviewed the proposed seed mixes and approves of their use. Additionally, the contracted restoration company will work with Regal Solar to develop implementation plans for maintenance of the prairie throughout the life of the Project. More information on maintenance of the prairie is outlined in the Vegetation Management 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 Regal 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

Regal Solar, LLC (Regal), a wholly owned subsidiary of Geronimo Energy, LLC (Geronimo), proposes to construct the Regal Solar Project ("Project," "Project Site," "Project Area") on approximately 802 acres (Land Control Area) of land in Langola Township Sections 12 and 13, Township 38 North, Range 32 West, and Sections 18 and 19, Township 38 North, Range 31 West, Benton County, Minnesota (Figure 1). Regal anticipates that approximately 711 acres (Preliminary Development Area) will be affected by Project facilities (Figure 2). The Project lies adjacent to and west of U.S. Highway 10, east of the Mississippi River and is approximately midway between the towns of Rice to the southeast and Royalton to the northwest. The Project will generate up to 100 MW, enough energy to provide electricity for approximately 23,000 homes annually and avoid the emission of approximately 150,000 metric tons of carbon annually. The Project is to be placed in service by the end of 2021.

The Project will interconnect to the adjacent Platte River Substation, which is owned and operated by Minnesota Power. Regal Solar selected this site due to its close proximity to existing and planned transmission facilities, existing road infrastructure, and the flat, unobstructed terrain on the site. Importantly, in selecting the site, Regal Solar also concluded that its development will not result in significant environmental impacts.

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.

Regal has entered into a Purchase Option Agreement with the landowner for all of the parcels on which the Project would be constructed. Regal would exercise its purchase option and hold title to all the property prior to the start of construction. All Project facilities shown in the preliminary site layout (Figures 3 and 4) were sited on land for which Regal Solar currently has site control. The current land interests under option are sufficient to accommodate the Project's facilities and setback requirements.

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;
- Project substation;
- Operations and maintenance (O&M) building;
- Access roads;
- Up to two weather stations (up to 20 feet tall); and
- Perimeter fencing.

Each of these components is described in more detail below.

2.2.1 Configuration of Solar Panels, Arrays, and Racking

The Project will convert sunlight into direct current (DC) electrical energy within PV panels (panels). For purposes of describing construction, the Regal project can be considered an aggregate of individual PV panel components interconnected by cabling and infrastructure at increasing scales to ultimately deliver up to 100 MW of alternating current (AC) of electricity to the existing Platte River Substation currently on the electrical grid and adjacent to the Project. From smallest to largest scales these are described below and presented on Figure 5:

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 290-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.
4. **Blocks** 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 block. Boundary access roads are typically present on the east and west sides of individual blocks.
5. **Construction Units** consist of Blocks of PV panels delineated by their connectivity and relationship to main roads. The Regal Project consists of
   a. a 94-acre **North Unit** bounded by County Road 40 to the south and US Highway 10 (US 10) on the east,
   b. n 309-acre **Southwest Unit** bounded by County Road 40 to the north and County Road 73 to the east, and
   c. a 300-acre **Southeast Unit** bounded by County Road 73 on the west, and US 10 on the east.

Regal Solar will use a single axis tracking system where the panels within a line are rotated by small motors to track with the sun throughout the day. The panels aligned in rows north and south face east in the morning, parallel to the ground during mid-day, and then west in the afternoon. Panels can be manually oriented to the east or west at maximum tilt angle to facilitate maintenance access and vegetation management, if necessary, although spacing between the lines of panels is typically 16 feet and sufficient for maintenance vehicles. Separation of PV Panel lines will typically be 23-feet from turning axis to turning axis.

Each block 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. The panels deliver DC power to the inverters through cabling that will typically be buried in a backfilled trench or, aboveground cable trays or conduit. Each inverter pad will also include one or more transformers to which the inverters will feed electricity. After the inverter has converted the electricity from DC to AC, the electricity is stepped-up via a transformer from low-voltage to medium voltage (up to 34.5 kilovolts [kV]). The final number of inverters for the Project will depend on the inverter size, inverter and panel availability as well as the final panel configuration and facilities selected for construction. The Project's preliminary design has proposed 40 central inverter skids and electrical cabinets (one inverter is required for every 2-3 MW). These structures enclose the inverter and communication equipment. The cabinets may be placed atop a concrete slab or pier foundations and typically measure 10 feet by 25 feet. The inverters are within the interior of the Project along access roads.

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 the Project substation. These cables may be installed in an above-ground or below-ground system. 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 Project Substation

The Project will have an on-site substation that combines all the AC power from the collection circuits. This substation will be located within the Project Area North Unit and in proximity to the existing Platte River Substation as depicted in Figure 1. The Project substation will occupy approximately 1.4 acres and the ground coverage will be washed rock. Within the substation there will be breakers, steel over-head bus work, main power transformers and a control building that will house the SCADA equipment that helps to run the project.

The Project will interconnect into the existing Platte River Substation via a 115-kV overhead gen-tie transmission line of less than 1,500 feet. There will be a single dead-end structure within the Project substation and likely 2-3 additional structures to enter the Platte River Substation, pending final engineering. Per Minn. Stat. 216E.01 subd. 4, the transmission line does not meet the high voltage transmission line definition because its less than 1,500 feet. As such, a Route Permit will not be required for the gen-tie line.

2.2.4 Access Roads

The Project will include approximately 12.4 miles of graveled access roads for the below-ground and hybrid below-ground and above-ground configurations and 12.5 miles of graveled access roads for the above-ground configuration that lead to the inverters and Project substation for operation and maintenance. The final length of the access roads will depend on the equipment selected and final engineering. The arrays and inverters will be accessible via approximately 16-foot-wide primary access corridors situated in orthogonal north-south and east-west directions. Permanent access corridors will consist of compacted road base used for operation and maintenance activities. Temporary access roads will be required to traverse the site during construction. Temporary roads will be staked and used as needed. There are four access points to the Project from existing county roads (two along Halfway Crossing NW and two off of 45th Ave NW). These entrances will have locked gates. The Project will not be accessed off of U.S. Highway 10.

Per the request of Benton County and Langola Township, Regal has included an access road around the parameter of the Project to provide an additional buffer from the railroad adjacent to Highway 10 to mitigate concerns related to passing trains potentially producing sparks. Access roads around entire facilities this large are necessary for effective and efficient access for operations and maintenance and for safe ingress and egress of employees, visitors and emergency responders. Regal has minimized the amount of access roads within the Preliminary Development Area. Prior versions of the site plan had access roads between every block of racking, which resulted in approximately 15.6 miles of access roads. The site plan included in this Application has removed ancillary access roads that don't provide direct access to inverters resulting in a nearly 20% decrease in the miles of access roads included in the Project design. This design minimizes impacts to soils.

Some upgrades or other changes to the public roads may be required for construction or operation of the Project. Regal will work with the appropriate road authorities to facilitate and pay for required upgrades that meet the required public standards. Upgrades or changes could include, but are not limited to, road improvements, additional aggregate, field access or driveway changes.

2.2.5 Fencing

Permanent security fencing will be installed along the perimeter of the solar arrays and Preliminary Development Area. Fencing will be secured to posts which will be directly embedded in the soil or set in concrete foundations as required for structural integrity. The fencing will consist of an agricultural woven wire fence and will extend approximately 6 feet above grade. At the request of MN DNR, barbed wire will not be used around the perimeter of the Project, and instead 1 foot of 3-4 strands of smooth wire will be used. However, the fencing around the substation will be a 6-feet above grade chain-link fence and include 1 foot of barbed wire to comply with the National Electric Code. This fencing will be designed to prevent the public from gaining access to electrical equipment which could cause injury. Additionally, the fencing will prevent larger wildlife from entering the facility.

This fencing will be designed to prevent the public from gaining access to high-voltage electrical equipment which could cause injury. Additionally, the fencing will prevent larger wildlife from entering the facility.

2.3 Construction

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 2020 harvest season. Alternatively, and depending on construction timing, Regal may plant a cover crop in Spring 2020 that is compatible with the Project's Vegetation Management Plan (Appendix C). This cover crop would stabilize soils if row crops are not planted that year.

2.3.2 Earthwork

The majority of soil disturbances will occur during the first phase of Project construction when the grading activities take place. The Contractor may need to move some soils to "flatten" certain parts of the local terrain or, at the very least, to complete minor grading of topsoils. The earthwork activities will be completed using typical civil construction equipment – scrapers, bulldozers, front-end loaders, back-hoes or skid-steers. BMPs that will be used during these earthmoving activities are described in detail in Access Road Construction.

2.3.3 Access Road Construction

As a component of earthwork, permanent access roads and permanent turnouts will be developed as indicated in Figure 1, within the Project perimeter fence. This work would start with the stripping and segregating of topsoil materials from the anticipated 16-foot-wide road width. The Contractor will then compact the subgrade materials 16-feet wide to the specified compaction requirements as laid out by the civil and geotechnical engineer. After compaction is reached and verified, the Contractor will then install the road as designed, typically done with or without geo-fabric depending on the soil type, and then, with a surface of 4 to 12 inches of gravel. The gravel will be placed level with the existing grade to facilitate drainage and minimize ponding.

After gravel is installed and compacted to 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 area.

Regal anticipates that a minimum of topsoil will need to be removed due to grading. Topsoil removed from permanent access roads will be removed to suitable locations near the site of removal and spread across existing topsoil for storage. Storage locations will be identified (GPS boundary and depth) and recorded on site maps to facilitate final reclamation after decommissioning.

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. In some situations where soils are low strength or consist of loose, non-cohesive sand, helical screw or auger-type foundation posts may be used. Foundations are typically galvanized steel and used where high load bearing capacities are required. The pile is driven using a hydraulic ram or screw installer that moves along tracks, and is operated by two workers. 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.

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 using steel cross-members, to create a "rack" to which the solar panels can be fastened.

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

2.3.5 Electrical Collection System

As noted in Section 2.2.1, the collection system will either be buried in a trench or aboveground in cable trays or conduit. This technology is rapidly evolving and may be site-specific depending on geotechnical analysis, constructability, and availability of materials. Final engineering and procurement will help determine the construction method for the electrical collection system. For the purposes of this Plan, Regal provides construction methods and BMPs for trenching; aboveground collection lines would not require a trench and therefore, have fewer impacts to soils.

Collection system cabling will 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 from the trenched area using a small backhoe and would be temporarily stored adjacent to the trench. Similar to the pile drivers used to install the racking, the soil disturbance from the trenching machines would be restricted to the trenching machine tracks only. This machine is the size of a small tractor. Once cables are installed, the trenches would be backfilled using a small, rubber tire or tracked backhoe and compaction equipment. Topsoil would be replaced to the restored trench line, and the pre-construction contour would be re-established using a small front-end loader.

BMPs that will be used during these earthmoving activities are described in detail in Section 3.

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 Project Substation Construction

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

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

In both scenarios, the limit of disturbance will be within the footprint of the substation for both the foundation equipment and the concrete delivery trucks. BMPs that will be used during these earthmoving activities are described in detail in Section 3. All topsoil from the Substation footprint will be removed to a pre-established suitable location for storage. The storage area would be near the site where the soil was removed, accurately located (GPS boundary, soil depth) and graded to facilitate revegetation. Subsoil would be removed, if necessary, to an acceptable preestablished and approved area for storage. After decommissioning, subsoil will be returned to the area from which it was excavated (as needed), topsoil will be replaced, and the area will be brought back to pre-construction contours.

2.3.8 Generator-Tie Line Construction

Given the close proximity of the Platte River Substation and the proposed Project Substation, a 115-kV gen-tie line of less than 1,500 feet will be required. This includes 2-3 structures outside of either substation.

2.3.9 Project Fencing Installation

A fencing company will be contracted to construct the perimeter fencing around the Project. The fencing will consist of an agricultural woven fence and will extend approximately 6 feet above grade. At the request of MN DNR, barbed wire will not be used around the perimeter of the Project, and instead 1 foot of 3-4 strands of smooth wire will be used. However, the fencing around the substation will be a 6-feet above grade chain-link fence and include 1 foot of barbed wire to comply with the National Electric Code. 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 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 soybean rotations are grown under irrigated agriculture. Regal assumes that upon decommissioning, all surface infrastructure will be removed and the land will be restored to irrigated agriculture.

3.2 Important Soil Characteristics

The Soil Survey Geographic Database (SSURGO) is the digitized county soil survey and provides a 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 arras;
- Inverter Locations
- Access Roads
- Laydown Areas
- Project Substation and O&M facility.

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 802-acre Land Control Area but not anticipated to be affected by construction or operations are not included in the following analysis, which only includes the approximately 711 acres that will be affected by construction.

A soil map of the Regal Project site 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 710.8-acre development area in Table 1.

Table 1: Acreage of Soils with Selected Physical Characteristics by Project Feature within the Project Development Area (Total 710.8 acres)

Project Feature	Total Acres[1]	Textural Family[2]	Slope Range[3]		Drainage Class[4]			Topsoil Thickness[5]		Shallow Bedrock/ Stony[6]
		Sandy	0-5	>5-8	Excessive	Poor	Very Poor	>12 -18	>18	
	Acres									
Fence Area	677.4	677.4	660.0	17.4	676.8	0.4	0.2	0.6	676.8	0.0
Access Roads	24.5	24.5	23.7	0.9	24.4	0.1	0.1	0.2	24.4	0.0
Inverters	0.4	0.4	0.4	Trace	0.4	0.0	0.0	0.0	0.4	0.0
Laydown Yards	7.0	7.0	6.1	0.8	7.0	0.0	0.0	0.0	7.0	0.0
O&M/Sub-station	1.4	1.4	1.4	0	1.4	0.0	0.0	0.0	1.4	0.0
Total	**710.8**	**710.8**	**691.7**	**19.1**	**705.7**	**0.5**	**0.2**	**0.8**	**710.0**	**0.0**

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™ Access.
2 Data available directly from the NRCS 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.
5 Topsoil thickness is the aggregate thickness of the A horizons described in the SSURGO database.
6 Depth to 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.

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. All of the soils within the Preliminary Development Area (710.8 acres) 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.

Slope affects constructability, water erosion, revegetation, compaction and rutting, among other properties. Most soils (687.4 acres, 97 percent) within the Preliminary Development Area are nearly level soils with representative slopes falling within the 0-5 percent slope range. A few soils (19.1 acres, 3 percent) have representative slopes in the >5 – 8% class. A very small quantity of Sandberg soils with 22 percent representative slopes are indicated on the fringe of the Project Area were examined in GIS and are miss-mapped. These soils were placed into the adjacent D67B map unit (Hubbard soils 1-6% slopes).

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 (705.7 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 poor and very poor drainage class (0.7 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 18 inches in depth (710.0 acres, 99 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 Preliminary Development Area are shallow to bedrock or have stones at the soil surface or within the soil profile.

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 710.8-acre development area in Table 2.

Table 2: Acreage of Soils with Selected Classification Data by Project Feature Within the Project Development Area (Total 710.8 acres)

Project Feature	Total Acres[1]	Prime Farmland[2]	Land Capability Class[2]				Hydric Soil[2]
			4s	4w	6s	6w	
	Acres						
Fence Area	677.4	0.0	659.5	0.4	17.4	0.2	0.6
Access Roads	24.5	0.0	23.5	0.1	0.9	0.1	0.2
Inverters	0.4	0.0	0.4	0.0	Trace	0.0	0.0
Laydown Yards	7.0	0.0	6.1	0.0	0.8	0.0	0.0
O&M/Substation	1.4	0.0	1.4	0.0	0.0	0.0	0.0
Total	**710.8**	**0.0**	**690.9**	**0.5**	**19.1**	**0.2**	**0.8**

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.

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 are Prime Farmland.

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 Preliminary Development Area are in LCC 4s, 4w, 6s and 6w. A numerical value of 4 indicates soils with very severe limitations that restrict the choice of plants, require very careful management or both, and 6 indicates the presence of a severe limitation rendering them unsuited to cultivation. "s" indicated that the limitation is a soil characteristic, here coarse texture, and "w" indicating a wetness limitation. Most of the soils (690.1 acres, 97 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 (710.0 acres, 99 percent), with only 0.8 acres being considered hydric soils in narrow drainageways.

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 710.8-acre development area in Table 3.

Table 3: Acreage of Soils in Selected Construction-related Interpretations by Project Feature Within the Project Development Area (Total 710.8 acres)

Project Feature	Total Acres[1]	Highly Erodible[2]		Compaction Prone[3]	Rutting Hazard[4]		Drought Susceptible[5]
		Water	Wind		Unlikely	Probable	
	Acres						
Fence Area	677.4	0.0	677.4	0.0	677.4	0.6	676.8
Access Roads	24.5	0.0	24.4	0.0	24.4	0.2	24.4
Inverters	0.4	0.0	0.4	0.0	0.4	0.0	0.4
Laydown Yards	7.0	0.0	7.0	0.0	7.0	0.0	7.0
O&M/Sub-station	1.4	0.0	1.4	0.0	1.4	0.0	1.4
Total	**710.8**	**0.0**	**710.0**	**0.0**	**710.0**	**0.8**	**710.0**

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.

Highly erodible land is identified as being susceptible to water and wind erosion. The majority of soils in the Preliminary Development Area are low relief, coarse-textured soils with rapid water infiltration characteristics that limit soil erosion by the agent of water. None of the Project Area has soils that 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 710.0 acres (99 percent) of soils within the Project area are highly wind erodible, including all soils save those in poor and very poor drainage classes (0.8 acres, Table 1).

Soils prone to compaction and rutting prone 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 0.8 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 (710.0 acres, 99 percent) of the soils within the Preliminary Development Area are susceptible to drought.

3.2.4 Summary of Major Soil Limitations at the Regal Solar Project

3.2.4.1 Wind Erosion (Dust)

Soils within the Regal Project Site 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 12 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, Regal 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 Regal Solar. 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 Preliminary Development Area is considered prime farmland.

Because all construction activities will be limited to land owned by Regal Solar, no direct impacts to adjacent land are expected. Additionally, the technology to be deployed at this facility does not require that the entire Project Site 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 Preliminary Development Area 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 Site, the majority of the Project Site'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

Regal Solar will contract with a third-party to monitor earthmoving activities during the initial phase of Project construction to ensure appropriate measures are taken to properly segregate and handle the topsoils. Regal Solar will coordinate with MDA to identify a suitable environmental monitor (Monitor). The Monitor will have a variety of duties, including but not limited to:

- Perform weekly 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 Regal 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 report of Regal Solar's adherence to soil BMPs to MDA on a weekly basis during the major earthmoving phase of Project construction and upon completion of earthmoving activities.

Potential issues with BMPs will be reported to Regal's construction manager and to MDA. The construction manager 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 Site 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 is typically over 18 inches. This will be confirmed with tests by a Minnesota Licensed Professional Soil Scientist prior to earthwork activities on the site. Regal Solar 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. Regal Solar will provide this information and a recommendation on specific segregation methods/techniques to the Monitor for review and input. As an interim recommendation Regal 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. Regal Solar 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 Site 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.

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 Regal Solar 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 Site. 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, Regal Solar'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 soil scientist and 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, Regal Solar will work with the Monitor, MDA and other appropriate agencies to discuss potential new approaches to the specific conditions that are encountered.

Regal Solar 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 Site where all major cut and fill activities will be performed by the Contractor. As stated above, Regal Solar 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. Based on discussions with MDA, topsoils in this region of Minnesota may reach depths of 3-feet. This will be confirmed with tests by the soil scientist prior to grading activities. Regal Solar will provide this information and a recommendation on specific segregation methods/techniques to the MDA for review and input.

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. Based on preliminary design, engineering expects approximately 230 acres to require grading. 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, top soil 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 16-foot-wide 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. As discussed in Section 2.3.3, 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 Preliminary Development Area.

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. Regal 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

Regal Solar will prevent excessive soil erosion on lands disturbed by construction by adhering to a Storm Water Pollution Prevention Plan (SWPPP) required under the National Pollutant Discharge Elimination System (NPDES) permitting requirement that will be administered by the Minnesota Pollution Control Agency (MPCA).

Prior to construction, Regal 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, near waterways, and near drain tile inlets. This silt fencing would control soil erosion via stormwater. Check dams and straw waddles will also be used to slow water during rain events in areas that have the potential for high volume flow. 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 identify designated 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

At this time, Regal Solar does not anticipate drain tile to be present within the Preliminary Development Area. 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, Regal Solar 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

Per the purchase option agreement with the landowner, the landowner will be required to remove irrigation equipment and cap existing wells prior to construction. These wells will then be marked with flagging and a five-foot buffer around them fenced so as to avoid impacts to these structures. If Regal identifies a need for wells during operations, these wells may be uncapped or new wells will be installed.

4.11 Construction Debris

Construction-related debris and unused material will be removed by Regal Solar and the Contractor. Any below-grade, unusable materials will be removed and loaded immediately onto trucks for subsequent disposal at a designated off-site location. The Contractor will use locally sourced dumpsters and removal services to regularly check and schedule pick-ups for full dumpsters which will be switched out for empty ones. To the extent practicable, recyclable materials (i.e., cardboard) will be sorted and recycled at a local facility.

Debris/trash collection points and dumpsters will be located both in the laydown yards as well as at strategically designated locations close to where actual work is being performed. If loose debris fails to be deposited into dumpsters or if it becomes wind-blown, the Contractor will inspect and clear fence lines of debris on a daily basis to ensure that debris and trash does not leave the Project Area. Contaminated materials are not expected; however, if any such materials are encountered during construction, specialized dumpsters and handling instructions will be employed to suit the types of contaminated materials that are discovered. Contaminated materials will be disposed of at the nearest appropriate facility in accordance with applicable laws, ordinances, regulations, and standards.

5.0 Decommissioning

At the end of the Project's useful life, Regal 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. Decommissioning activities will include:

- Removing the solar arrays, transformers, electrical collection system, fencing, lighting and substations, and possibly the O&M facility (the O&M facility may be useful for other purposes);
- Removal of underground electrical cables to a depth of four feet (cables buried below four feet will be left in place);
- Removal of buildings and ancillary equipment to a depth of four feet;
- Removal of surface road material and restoration of the roads to substantially the same physical condition that existed immediately before construction. If the Project is decommissioned and the land sold to a new owner, Regal would retain any access roads the new landowner requested be retained;
- Grading, adding or re-spreading topsoil, and reseeding according to the Natural Resources Conservation Service (NRCS) technical guide recommendations and other agency recommendations, areas disturbed by the construction of the facility or decommissioning activities, grading and soil disturbance activities will be kept to the minimum necessary to restore areas where topsoil was stripped in construction, topsoil in decommissioned roads and compaction only in areas that were compacted during decommissioning activities so that the benefits to the soil that were achieved over the life of the Project are not counteracted by decommissioning; and
- Standard decommissioning practices would be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements, and restoration.

5.1 Timeline

Decommissioning is estimated to take six to twelve months to complete and the decommissioning crew will ensure that all equipment is recycled or disposed of properly.

5.2 Removal and Disposal of Project Components

The removal and disposal details of the Project components are found below.

- Modules: Modules inspected for physical damage, tested for functionality, and removed from racking. Functioning modules packed and stored for reuse (functioning modules may produce power for another 25 years or more). Non-functioning modules packaged and sent to the manufacturer or a third party for recycling or another appropriate disposal method;
- Racking: Racking uninstalled, sorted, and sent to metal recycling facility;
- Steel Pier Foundations: Steel piles removed and sent to a recycling facility;
- Wire: belowground wire abandoned in place at depths greater than four feet. Wire above four feet removed and packaged for recycling or disposal;
- Conduit: Aboveground conduit disassembled onsite and sent to recycling facility;

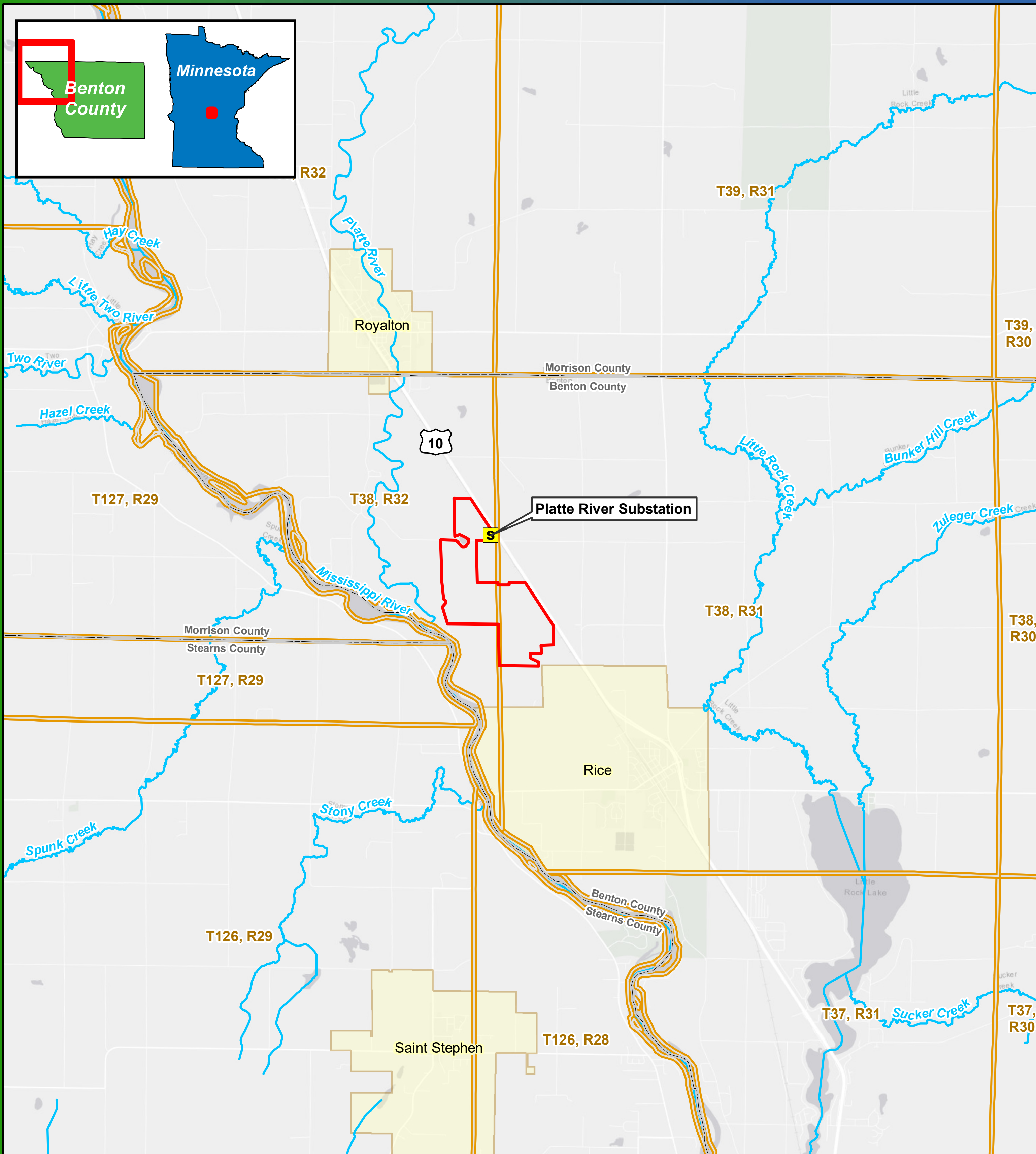
- Junction boxes, combiner boxes, external disconnect boxes, etc.: Sent to electronics recycler;
- Inverter/Transformer: Evaluate remaining operation life and resell or send to manufacturer and/or electronics recycler;
- Concrete pad(s): Sent to concrete recycler;
- Fence: Fence will be sent to metal recycling facility and wooden posts for the agricultural fence will be properly disposed; and
- Computers, monitors, hard drives, and other components: Sent to electronics recycler. Functioning parts can be reused.

5.3 Restoration/Reclamation of Facility Site

After all equipment is removed, the facility would be restored to an agricultural use, in accordance with the AIMP or to another use if the economic conditions at that time indicate another use is an appropriate use 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 soil to existing conditions and seeded. Grading and other soil disturbance activities during decommissioning will be kept to the minimum necessary to effectively decommission the site to maintain the soil benefits realized during the long-term operation of the Project, such benefits include: building topsoil through plant matter decay, carbon capture, and beneficial, soil bacteria that are often absent from soil subject to rowcrop agriculture. This will include the revegetation.

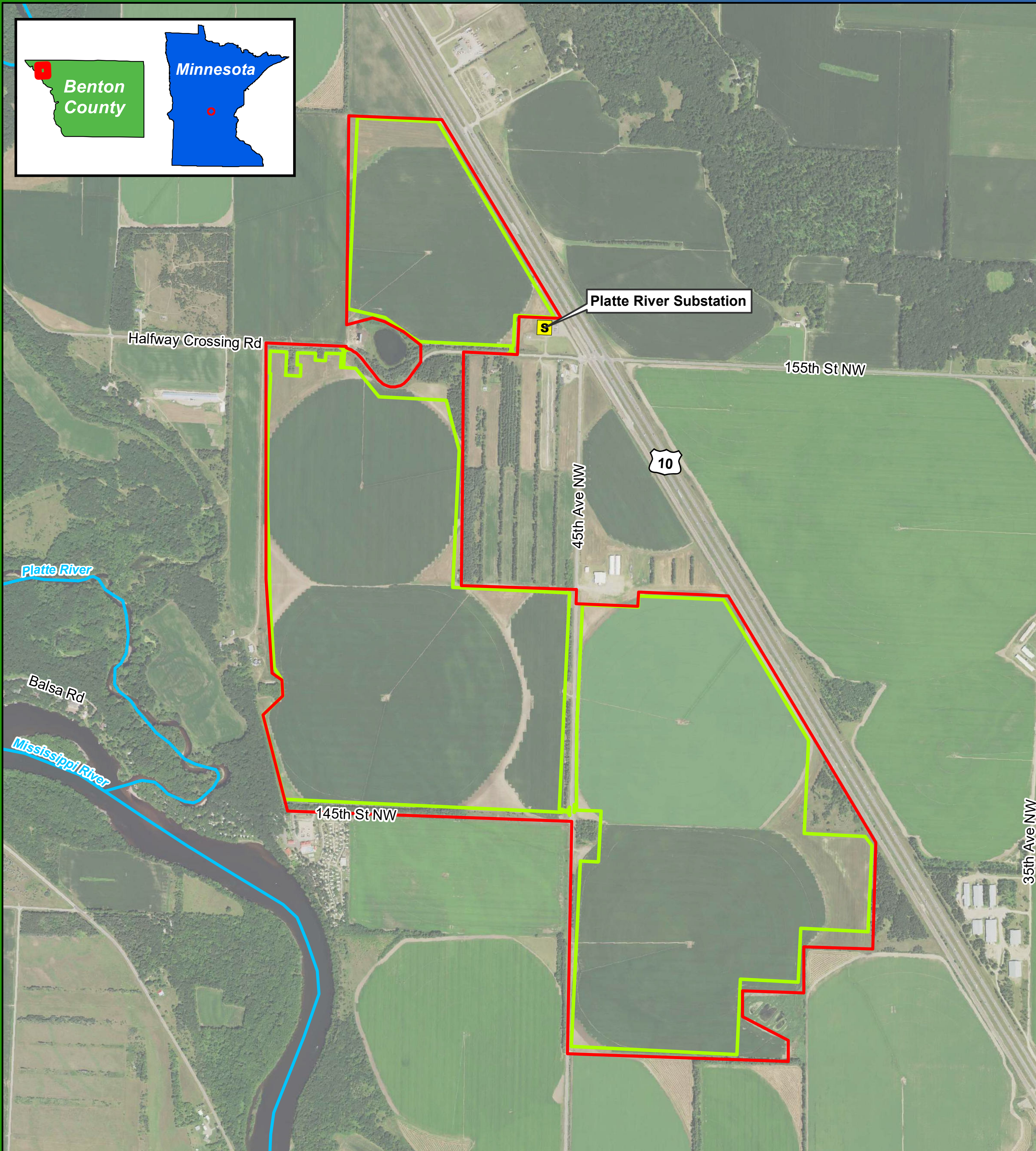
Regal reserves the right to extend operations instead of decommissioning at the end of the site permit term. In this case, a decision may be made on whether to continue operation with existing equipment or to retrofit the facilities with upgrades based on newer technologies. If the decision is made to continue operations, the Project will be re-permitted.

Figures



REGAL SOLAR

Figure 1
Project Location
Regal Solar Project
Benton County, MN
45.783906, -94.261881



REGAL SOLAR

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Figure 2
Land Control and Developmnet Areas
Regal Solar Project
Benton County, MN
45.783906, -94.261881

S Existing Substation
Land Control Area
Preliminary Development Area

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brian.schreurs Date: 9/4/2019

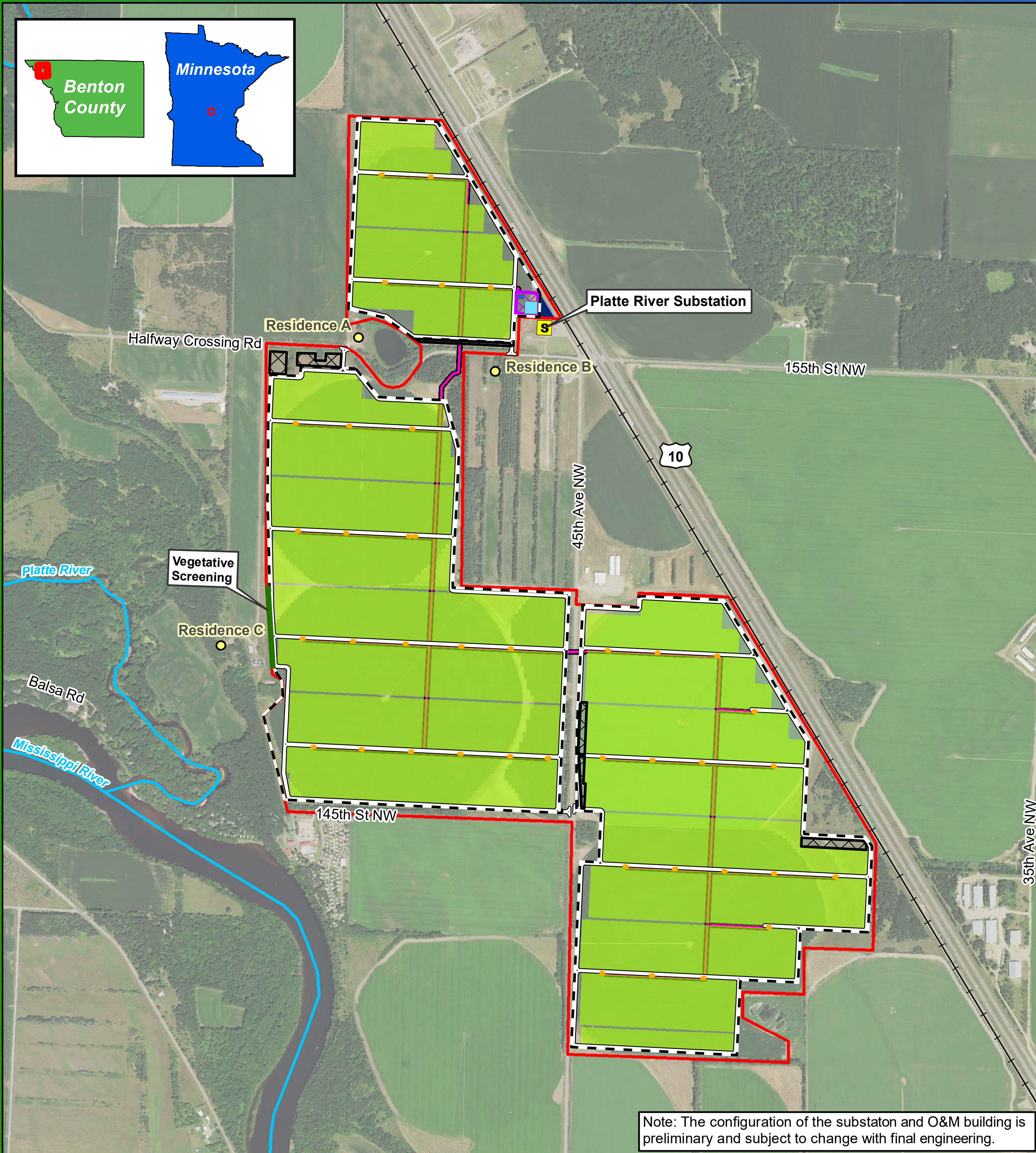

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Figure 3
Below-Ground Preliminary Project Layout
Regal Solar Project
Benton County, MN
45.783906, -94.261881

Adjacent Residence
Existing Substation
Collection Line
Vegetative Screening
Land Control Area
Security Fence
Potential Gen-Tie Routing Area
Access Road
Solar Array
Inverter
Associated Facilites
Project Substation
O&M Facility
Laydown Area
NHD Stream
Railroad

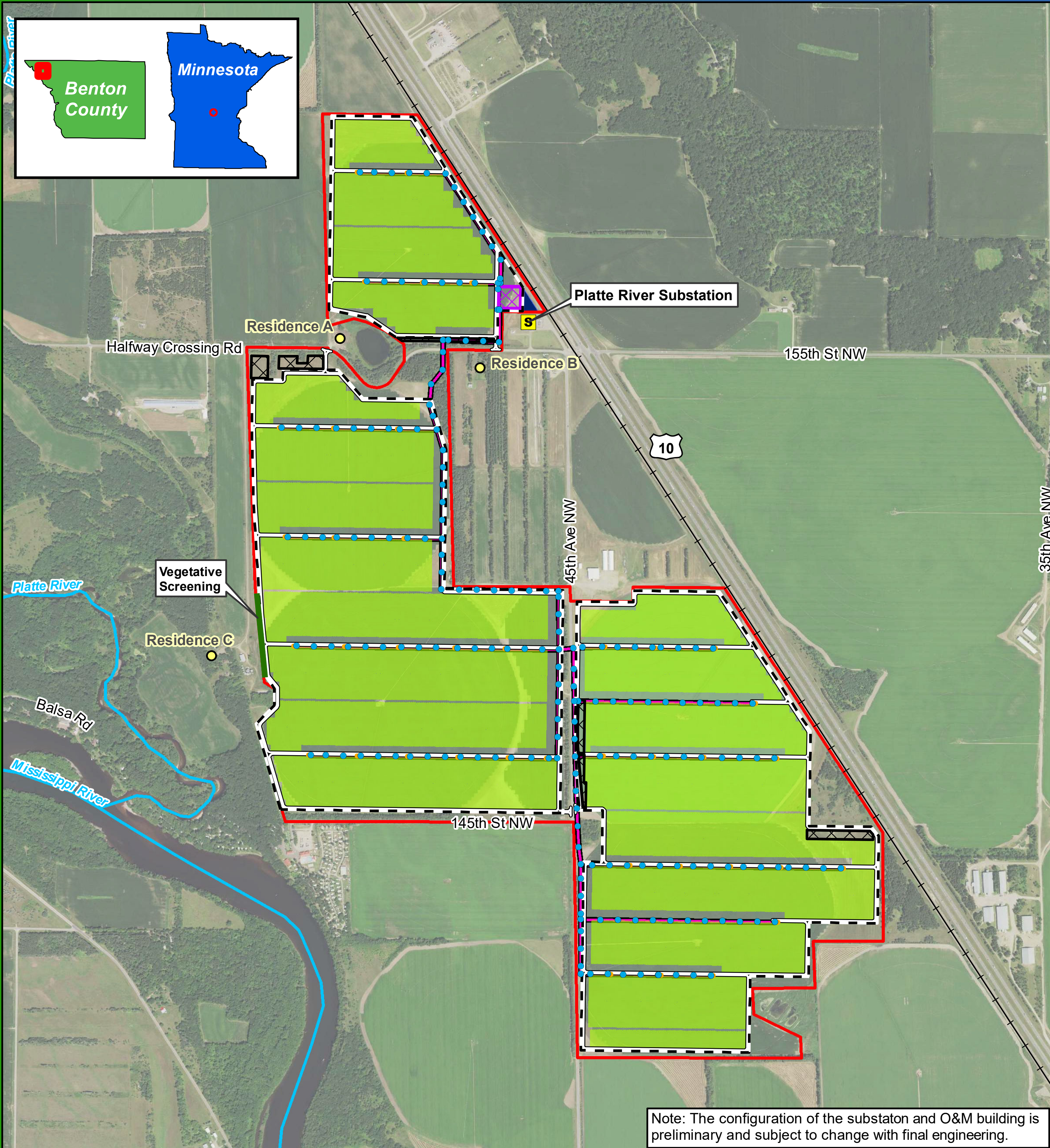

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Figure 4
Above-Ground Preliminary Project Layout
Regal Solar Project
Benton County, MN

45.783906, -94.261881

- Above-Ground Collection Pole
- Adjacent Residence
- Existing Substation
- Collection Line
- Vegetative Screening
- Land Control Area
- Security Fence
- Potential Gen-Tie Routing Area
- Access Road
- Solar Array
- Inverter
- Associated Facilities
- Project Substation
- O&M Facility
- Laydown Area
- NHD Stream
- Railroad

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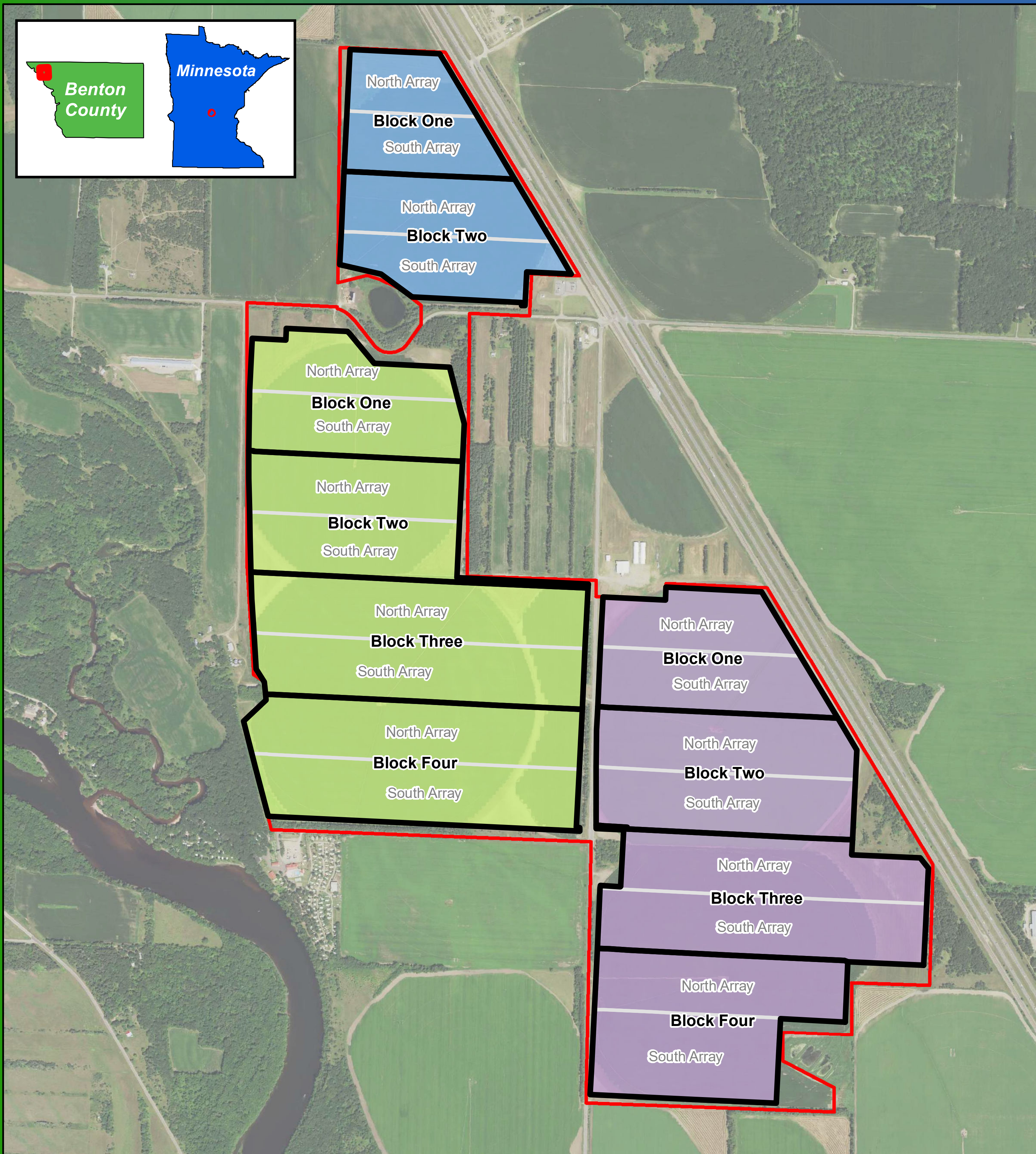
brie.anderson Date: 9/4/2019



REGAL SOLAR

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Figure 5
Configuration of Project Components
Regal Solar Project
Benton County, MN

45.783906, -94.261881

- Project Area
- North Unit
- Southeast Unit
- Southwest Unit
- Array Boundary

Note: See Appendix A for detail

Appendix A

Selected Soil Physical Features, Classifications, and Interpretations and Limitations

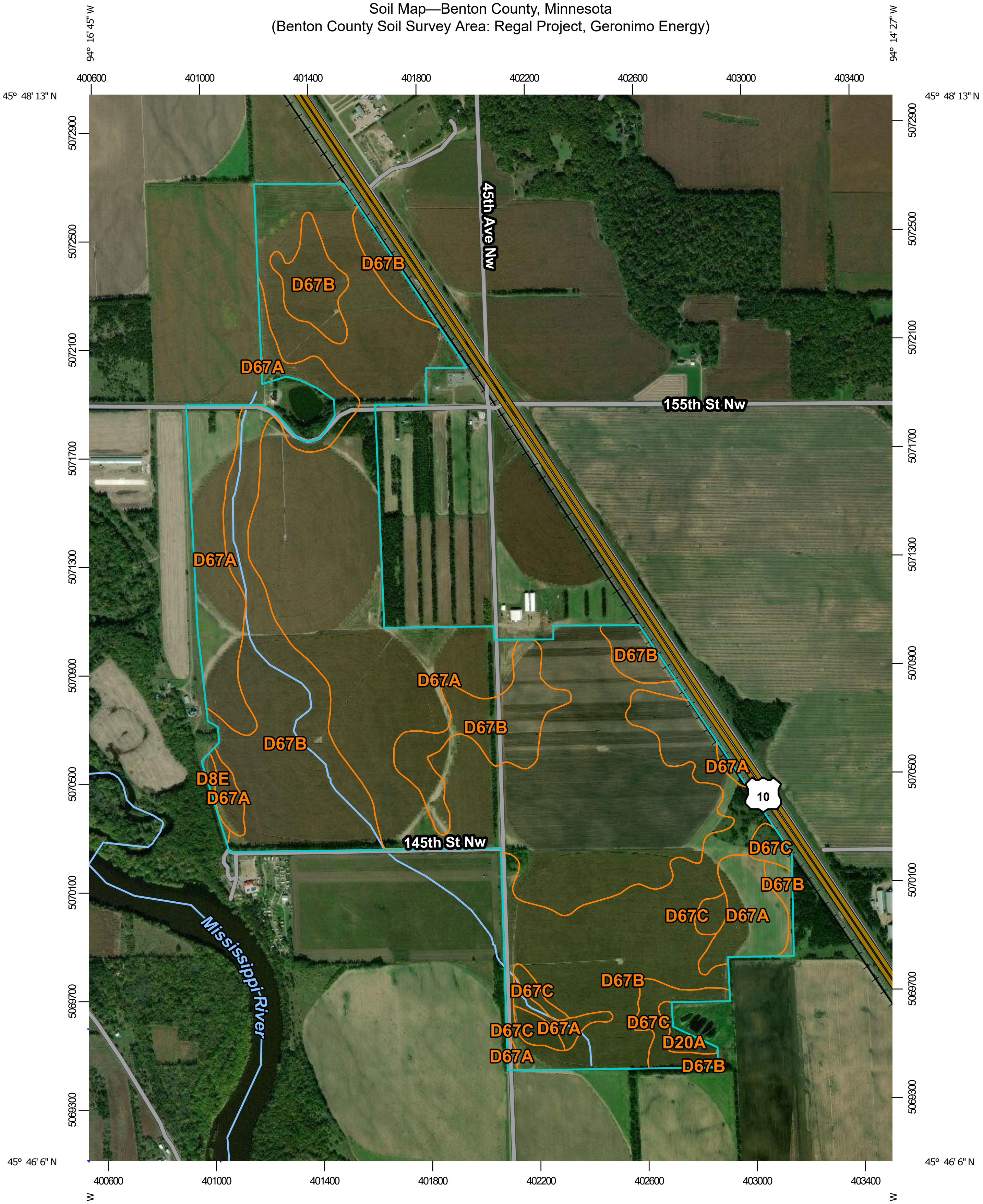
Appendix A: Selected Soil Physical Features, Classifications, and Interpretations and Limitations

Feature Type[1]	Acres[2]	Map Unit Symbol[3]	Map Unit Name[3]	Selected Soil Physical Features					Selected Soil Classifications			Construction/Reclamation Interpretations and Limitations				
				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]
Project Area	42.8	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	39.0	D67B	Hubbard loamy sand, 1 to 6 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	7.3	D67C	Hubbard loamy sand, 2 to 12 percent slopes	Sandy	>5-8	ED	>18	No	No	6s	No	No	Yes	No	Unlikely	Yes
	3.0	D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Sandy	0-5	PD\VPD	>12-18	No	No	4w/6w	Yes	No	Yes	No	Probable	Yes
Fence Area	399.3	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	260.2	D67B	Hubbard loamy sand, 1 to 6 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	17.4	D67C	Hubbard loamy sand, 2 to 12 percent slopes	Sandy	>5-8	ED	>18	No	No	6s	No	No	Yes	No	Unlikely	Yes
	0.6	D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Sandy	0-5	PD\VPD	>12-18	No	No	4w/6w	Yes	No	No	No	Probable	No
Access Road	14.3	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	9.3	D67B	Hubbard loamy sand, 1 to 6 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	0.9	D67C	Hubbard loamy sand, 2 to 12 percent slopes	Sandy	>5-8	ED	>18	No	No	6s	No	No	Yes	No	Unlikely	Yes
	0.2	D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	Sandy	0-5	PD\VPD	>12-18	No	No	4w/6w	Yes	No	No	No	Probable	Yes
Laydown	1.9	D67B	Hubbard loamy sand, 1 to 6 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	4.2	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	0.8	D67C	Hubbard loamy sand, 2 to 12 percent slopes	Sandy	>5-8	ED	>18	No	No	6s	No	No	Yes	No	Unlikely	Yes
O&M	1.4	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
Inverter	0.3	D67A	Hubbard loamy sand, 0 to 2 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	0.1	D67B	Hubbard loamy sand, 1 to 6 percent slopes	Sandy	0-5	ED	>18	No	No	4s	No	No	Yes	No	Unlikely	Yes
	trace	D67C	Hubbard loamy sand, 2 to 12 percent slopes	Sandy	>5-8	ED	>18	No	No	6s	No	No	Yes	No	Unlikely	Yes

1 Project Area include soils under Regal Solar lease 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™ 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.
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 Regal Solar Project



Map Scale: 1:19,100 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 250, 500, 1000, 1500

Feet: 0, 500, 1000, 2000, 3000

N

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 1:12,000.

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: Benton County, Minnesota
Survey Area Data: Version 15, Sep 12, 2018

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

Date(s) aerial images were photographed: Aug 1, 2015—Oct 11, 2017

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
D8E	Sandberg loamy coarse sand, 6 to 30 percent slopes	1.6	0.2%
D20A	Isan-Isan, frequently ponded, complex, 0 to 2 percent slopes	3.7	0.5%
D67A	Hubbard loamy sand, 0 to 2 percent slopes	462.5	57.6%
D67B	Hubbard loamy sand, 1 to 6 percent slopes	308.6	38.4%
D67C	Hubbard loamy sand, 2 to 12 percent slopes	26.4	3.3%
Totals for Area of Interest		**802.9**	**100.0%**

Appendix C

Vegetation Management Plan

Vegetation Management Plan

Regal Solar, LLC

Prepared for

Regal Solar, LLC

May 8, 2019

Prepared by

Ben Staehlin, M.S. & Kim Chapman, Ph.D.

21938 Mushtown Road

Prior Lake, MN 55372

APPLIED ECOLOGICAL SERVICES

Table of Contents

Appendices

I. Goals and Objectives

Regal Solar, LLC ("Regal") is developing a solar energy facility (SEF) which is planned to cover approximately 800 acres in Benton County, MN, and generate up to 100 megawatts (MW) of energy. Regal has developed this Vegetation Management Plan ("Plan") to guide site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. The goal of this Plan is to establish vegetative cover that complies with all permits and regulations. The required management is designed to continue for three years.

This document is intended to be a working document. Revisions will be made as new information is obtained with respect to vegetation management, site characteristics, and availability of management practices at the time of procurement of services.

II. Vegetation Installation Plan

After the solar panels and other infrastructure are installed, native seed mixes developed for the project in coordination with the Minnesota Department of Natural Resources (MNDNR) (Appendix 1) will be installed as described in the proposed planting plan for the site (in development). These seeds mixes are designed to be used with a vegetation management practice of traditional mowing. It is possible Regal could implement a vegetation management practice that uses sheep as grazers. Should Regal implement grazing as a long-term management technique, one or more separate seed mixes will need to be developed. All plant material must be installed as instructed during the specified time of year, as described below. Any exceptions must be discussed with Regal and the Contractor shall receive written authorization from Regal prior to the start of work.

All seed mixes must adhere to the specifications described in the Plan. Genetic source origin of all native seed shall be local, preferably from within a 200-mile radius of the site, and the plant species should be native to the county where the site is located (considerations of range shifts due to climate change may modify this guidance). Species shall be true to their scientific name as specified. Seed tags or nursery confirmation of the order must be provided to Regal prior to installation. Any species eliminations, substitutions, or source origin exceptions must be approved by Regal prior to installation. If planted in the spring, seeds shall have been properly stratified and/or scarified to break seed dormancy. All legumes shall be inoculated with proper rhizobia at the appropriate time prior to planting.

The preferred seeding timeframe is during the dormant season, after November 1 but before the soil starts to freeze. MNDNR recommends that a dormant seeding occur after soil temperatures fall below 50 degrees Fahrenheit for a consistent period of time. Seeding may be done in early spring if necessary, as soon as the soil is free of frost and in a workable condition, but no later than June 30. MNDNR recommends that a spring seeding occur after the soil temperature is 60 degrees Fahrenheit or higher. If seeding is done in the fall, seed mixes shall include 20 pounds per acre pure live seed (PLS) of winter wheat. If seeding is done in spring, seed mixes shall include 20 pounds per acre PLS of oats. If construction is completed between June 30 and November 1, the site shall be seeded with 20 pounds per acre PLS of oats to stabilize the soil and prevent erosion. The following fall, the native seed mixes shall be installed during the time described above but no additional cover crop shall be added to the seed mixes.

Seeding may be conducted with a seed drill (preferred) and/or by broadcast seeding; the Contractor shall evaluate the site and determine which technique will produce the best results. However, seed installed over a previous cover crop must be installed with a seed drill. Prior to installation, seed shall be divided into two equal parts. The first half shall be installed in one pass, and the second half installed in a second pass (perpendicular to the first pass, where possible). If broadcast seeding is used, gentle raking of seeded areas may be needed to ensure good seed-to-soil contact.

III. Vegetation Management Tasks

After the land is cleared and the panels are installed, a range of invasive plants will take advantage of the open soil and abundant light and germinate across the site. For the purpose of this Plan, "invasive plants" refers to both non-native species and native species that grow in an invasive manner or have the potential to negatively affect the success of the project (Appendices 2 and 3). These invasive plants must be managed effectively during the first three years to ensure that the planted native species are given the opportunity to flourish. The care taken in the first three years after installation strongly determines the quality of the resulting plantings. The work done during this initial period is referred to as the "establishment phase," while management after that period is called "perpetual maintenance."

A. Establishment Phase

The first three years of vegetation management are a concerted effort to remove invasive vegetation from the site while also helping the planted native vegetation establish. General tasks described below will be applied as directed, while other management techniques will be used only if required by the unique conditions at the Regal solar facility.

1. General Tasks

The first year of establishment is focused on consistent invasive plant control on a site-wide basis. Mowing during the first year should prevent invasive plants from adding new seeds to the soil and begin to exhaust the soil seed bank (a process that often requires several years to complete). From June 1 of the first establishment year, site-wide mowing to a height of 6-9 inches shall occur every four weeks, or whenever vegetation reaches a height of 18-24 inches, whichever comes first. Care shall be taken during the nesting season (April 1 to August 1) to not destroy the nests of upland grassland birds. Repeated mowings may produce a buildup of organic thatch, which discourages the development and persistence of diverse native vegetation. In order to help prevent thatch buildup onsite, either mowing shall be conducted with a flail-type mower or the site shall be hayed so that biomass is removed. A swing arm specifically designed for mowing under solar panels is recommended for cutting beneath panels, but spot-mowing with brush saws, weed whips, and similar equipment is also permitted. It may be possible to coordinate with Regal to adjust the orientation of the panels to increase the ease of mowing, but the Contractor should not depend on this coordination to complete their work. Any other techniques must be approved by Regal prior to installation. Mowing equipment shall be cleaned prior to use on site to prevent the introduction and spread of invasive and non-native species. This mowing regime will prevent annual and perennial weeds from flowering and setting seed, prevent weeds from shading out the solar panels, and help control woody plant growth onsite. Additionally, noxious and perennial weeds shall be treated by spot-herbiciding, as described below, to prevent roots from resprouting.

The second year of establishment continues invasive plant control but generally employs more targeted techniques. Site-wide mowing shall occur when vegetation height reaches 18-24 inches; expected frequency is twice in the growing season, once in mid-June and once in mid-August, but additional mowing may be required as vegetation height and weed development dictates. Again, care shall be taken during the nesting season (April 1 to August 1) to not destroy the nests of upland grassland birds. Spot-mowing may be employed to treat specific problem areas as needed. Noxious and perennial weeds shall be treated at least twice with spot-herbiciding, with the focus on achieving the required performance standards (described below).

In the third year of the establishment phase, invasive plant control should consist of spot-herbiciding to control the remaining small patches of persistent weeds. Efforts should be focused on achieving the required performance standards (described below). Additional onsite treatment with spot-mowing or hand weeding can be employed at the discretion of the contractor.

2. Prescribed Treatment for Common Invasive Species

Every SEF will express a suite of invasive plant species determined by the makeup of the seed bank and the seed inputs from the surrounding environment, so management must be flexible and respond to the specific needs of the Regal site. This Plan describes common techniques to manage a variety of invasive plants and common weeds growing in Minnesota, but not every technique will be required. During the establishment period, monthly evaluations of the plantings during the growing season (May to September) shall be conducted to help determine which techniques are needed, as well as the timing of treatments. Management techniques for five categories of weeds are described below.

a. Annual Weeds

Annual weeds include all unwanted species that grow for a single year, set seed, and die. Common annual weeds include grasses like barnyard grass (*Echinochloa crus-galli*), foxtails (*Setaria* spp.), and fall panicum (*Panicum dichotomiflorum*) and broadleaf weeds like lambsquarters (*Chenopodium* spp.), velvetleaf (*Abutilon theophrasti*), Pennsylvania smartweed (*Polygonum pensylvanicum*), and black nightshade (*Solanum nigrum*) (University of Minnesota, 2018). The most important purpose and result of treating annual weeds is preventing seed production. Beginning around June 1, the site shall be mowed as described above to prevent annual weeds from flowering and setting seed.

b. Minnesota Department of Agriculture Noxious Weeds

The Minnesota Department of Agriculture maintains a list of noxious weeds in the state which must be controlled by Regal (Appendix 2). All species of noxious weeds on site shall be treated by mowing, herbiciding, or a combination of both methods, with the intention of preventing the weeds from setting seed or spreading by rhizomes, stolons, or other vegetative means.

c. Perennial Weeds

Perennial weeds include all unwanted species that persist for two or more years after germination, from biennials to those that live for many years. Many of these weeds greatly diminish during the vegetation establishment phase with proper maintenance, but several require special attention due to their highly competitive behavior. These include grasses like Kentucky bluegrass (*Poa pratensis*), reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and several species of bromes, especially smooth brome (*Bromus inermis*). Broadleaf weeds in this category include sweet clovers (*Melilotus alba, M. officinalis*), cow vetch (*Vicia cracca*), crown vetch (*Securigera varia*), birdsfoot trefoil (*Lotus corniculatus*), Canada thistle (*Cirsium arvense*), and spotted knapweed (*Centaurea stoebe*). A list of common Minnesota perennial weeds that colonize former cropland and compete with native vegetation (in addition to the listed noxious weeds) is provided in Appendix 3.

Mowing is important to prevent seed production (as described above), but herbicide is generally required to prevent the spread of perennial weeds. Perennial grasses shall be treated by spot-spraying or boom spraying, as warranted, with glyphosate or comparably effective herbicide. Perennial broadleaf weeds shall be treated by spot-spraying or boom spraying, as warranted, with glyphosate, tryclopyr, clopyralid, or comparably effective herbicides. All herbicides shall be applied by a licensed applicator, following instructions provided by the manufacturer.

d. Problematic Native Plants

Several native species that are present in the soil seed bank or enter the site by seed rain from neighboring properties have the potential to interfere with the functioning of the solar panels. Giant ragweed (*Ambrosia trifida*) grows tall enough to shade the panels. Several native vines have the potential to overgrow installations, including wild grape (*Vitis riparia*), wild cucumber (*Echinocystis lobata*), bur cucumber (*Sicyos angulatus*), and Woodbine/Virginia creeper (*Parthenocissus* spp.). Giant ragweed, or any other native species shading the arrays, should be controlled by mowing (see above). If growing under or near the solar panels, wild cucumber and bur cucumber can be pulled and removed manually, but woody vines such as wild grape and Woodbine/Virginia creeper shall be cut to within 1 inch of the ground and the stump treated with glyphosate, tryclopyr, or a comparable herbicide by a licensed applicator, following instructions provided by the manufacturer.

e. Woody Species

Almost all woody species on site can shade or otherwise interfere with the operation of solar panels. During the establishment phase, all woody plants must be removed. This can be done by mowing, herbiciding, or a combination of both methods. All woody plants over 0.5 inches dbh (diameter at breast height, about 4.5 feet) shall be cut to within 1 inch of the ground and the stump treated with triclopyr or a comparable herbicide by a licensed applicator, following instructions provided by the manufacturer. Cut brush shall be removed from the site.

3. Re-seeding Bare Soil
Areas of bare soil are detrimental to successful establishment of native vegetation. Bare soil provides opportunities for the common invasive species described above to colonize and spread. Bare soil also contributes to soil loss by sheet erosion and prevents Regal from discharging its SWPPP permit in a timely fashion. If areas of bare soil greater than 75 ft^2 are found on site, the Contractor shall remedy the issue at their own expense by re-seeding the area, using the seed mix previously installed and following the timing instructions laid out in Section II (Vegetation Installation Plan).

B. Perpetual Maintenance

1. Mowing for Perpetual Maintenance
Following the end of the Establishment Phase of vegetation management, yearly management is still required to control the re-establishment and spread of invasive species, combat the establishment of undesirable and invading trees and shrubs, and reduce biomass/fuel load on site. This management may take the form of mowing or haying, depending on Regal preference and site feasibility. Some degree of hand weeding, spot-mowing, and/or spot-herbiciding may be warranted thereafter to maintain vegetation quality and achieve the project goals.

Annual site-wide haying (preferred) or mowing shall occur each October, or when prairie plants have gone dormant, to a height of 6-9 inches. Where feasible, mowed vegetation shall be bagged and removed to prevent the buildup of organic thatch, which will discourage the development and persistence of diverse native vegetation. If vegetation removal is not achievable, mowing shall be conducted with a flail-type mower to increase the rate of biomass decomposition.

2. Grazing for Perpetual Maintenance
Regal may decide to use grazing with sheep as a long-term vegetation management technique. Well-managed grazing can restrict woody vegetation and non-native species encroachment into grasslands, prevent excessive litter accumulation, improve forage production, and accelerate decomposition and nutrient cycling. Should grazing be selected as a management technique for some or all of the site, an additional section for this Plan will be developed that addresses methodology, stocking rate, water sources, grazing objectives, and seed mixes more appropriate for grazing. Grazing SEFs with livestock is a developing management approach; the instructions in this plan should be considered a guide, but the actual practices must adapt year-to-year to evolving vegetation conditions at the Regal Solar project.

IV. Vegetation Quality Targets

Vegetation management should result in a diverse plant community dominated by native species, as envisioned in the planting plans. Permits and regulations impose additional requirements on the final quality and performance of native plantings.

A. Native Vegetation Targets

By the end of the first growing season of the vegetation establishment phase, at least 60 percent of the site shall be vegetated. In order to discharge the SWPPP permit for the site, at least 45 percent of the site must be covered with uniform perennial vegetation (see Appendix 4 for the determination of this vegetation target and note that the party responsible for obtaining the SWPPP permit should consult with the MPCA to confirm the vegetation target); the contractor shall endeavor to achieve this by the end of the first growing season and must achieve this in the second growing season. By the end of the vegetation establishment phase (approximately 36 months after vegetation installation), at least 80 percent of the site shall be vegetated, and at least 80 percent of the cover shall be comprised of native species. Six or more species of planted native graminoids and 12 or more species of planted native forbs shall be well-established across the site.

B. Noxious Weeds and Problem Plants

All Minnesota prohibited noxious weeds and other problem plants (Appendices 2 & 3) shall be treated repeatedly with herbicide and mowed where appropriate at a frequency sufficient to prevent seed set and remove target weeds over time. Each treatment shall show evidence of at least 90 percent of the target vegetation having been affected by herbicide or removed. Two weeks after treatment, at least 95 percent of all herbicided plants shall be dead or dying within any 100 ft^2 area.

By the end of the vegetation establishment phase (approximately 36 months after vegetation installation), all prohibited noxious and other problem plants shall not exceed 5 percent aerial cover within any 100 ft^2 area.

V. References

Minnesota Department of Agriculture. 2018. Minnesota Noxious Weed List. Accessed September 2018 at https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list

University of Minnesota. 2018. Common annual weeds. Accessed September 2018 at https://extension.umn.edu/weed-management/weed-identification

Minnesota Department of Natural Resources. Revised June 2018. Prairie Establishment & Maintenance Technical Guidance for Solar Projects. Accessed April 2019 at https://files.dnr.state.mn.us/publications/ewr/prairie_solar_tech_guidance.pdf

Appendix 1. Seed Mixes for Regal Solar

Array Mix

Common Name	Scientific Name	Rate (oz/ac)	% of Mix (w/w)
Side-oats grama	*Bouteloua curtipendula*	48.00	32.7%
Blue grama	*Bouteloua gracilis*	7.00	4.8%
Slender wheatgrass	*Elymus trachycaulus*	40.00	27.3%
June grass	*Koeleria macrantha*	1.50	1.0%
Western wheatgrass	*Pascopyrum smithii*	4.00	2.7%
Canada bluegrass	*Poa compressa*	1.50	1.0%
Little bluestem	*Schizachyrium scoparium*	20.00	13.6%
Prairie dropseed	*Sporobolus heterolepis*	2.00	1.4%
	Grasses	**124.00**	**84.5%**
Prairie onion	*Allium stellatum*	1.00	0.7%
Thimbleweed	*Anemone cylindrica*	0.50	0.3%
Butterfly milkweed	*Asclepias tuberosa*	1.00	0.7%
Whorled milkweed	*Asclepias verticillata*	0.50	0.3%
Prairie coreopsis	*Coreopsis palmata*	0.50	0.3%
White prairie clover	*Dalea candida*	1.00	0.7%
Purple prairie clover	*Dalea purpurea*	4.00	2.7%
Stiff goldenrod	*Oligoneuron rigidum*	1.00	0.7%
Large-flowered beardtongue	*Penstemon grandiflorus*	1.00	0.7%
Prairie ragwort	*Packera plattensis*	0.25	0.2%
Long-headed coneflower	*Ratibida columnifera*	3.00	2.0%
Black-eyed Susan	*Rudbeckia hirta*	4.00	2.7%
Heath aster	*Symphyotrichum ericoides*	0.25	0.2%
Sky blue aster	*Symphyotrichum oolentangiense*	0.50	0.3%
Smooth aster	*Symphyotrichum laeve*	0.75	0.5%
Long-bracted spiderwort	*Tradescantia bracteata*	0.50	0.3%
Hoary vervain	*Verbena stricta*	2.00	1.4%
Heart-leaved alexanders	*Zizia aptera*	1.00	0.7%
	Forbs	**22.75**	**15.5%**
	Total	**146.75**	

<u>Open Mix</u>

Common Name	Scientific Name	Rate (oz/ac)	% of Mix (w/w)
Big bluestem	*Andropogon gerardii*	12.00	7.9%
Side-oats grama	*Bouteloua curtipendula*	36.00	23.6%
Blue grama	*Bouteloua gracilis*	6.00	3.9%
Canada wild rye	*Elymus canadensis*	42.00	27.5%
June grass	*Koleria macrantha*	1.00	0.7%
Little bluestem	*Schizachyrium scoparium*	16.00	10.5%
Indiangrass	*Sorghastrum nutans*	12.00	7.9%
Prairie dropseed	*Sporobolus heterolepis*	3.00	2.0%
	Grasses	**128.00**	**83.8%**
Leadplant	*Amorpha canascens*	1.00	0.7%
Thimbleweed	*Anemone cylindrica*	0.50	0.3%
Butterfly milkweed	*Asclepias tuberosa*	1.00	0.7%
Common milkweed	*Asclepias syriaca*	1.00	0.7%
Canada milk vetch	*Astragalus canadensis*	4.00	2.6%
Prairie coreopsis	*Coreopsis palmata*	0.50	0.3%
White prairie clover	*Dalea candida*	1.00	0.7%
Purple prairie clover	*Dalea purpurea*	4.00	2.6%
Grass-leaved goldenrod	*Euthamia graminifolia*	0.25	0.2%
Western sunflower	*Helianthus occidentalis*	0.50	0.3%
Round-headed bush clover	*Lespedeza capitata*	1.00	0.7%
Rough blazing star	*Liatris aspera*	0.50	0.3%
Wild bergamot	*Monarda fistulosa*	1.00	0.7%
Stiff goldenrod	*Oligoneuron rigidum*	1.00	0.7%
Large-flowered beardtongue	*Penstemon grandiflorus*	1.00	0.7%
Black-eyed Susan	*Rudbeckia hirta*	4.00	2.6%
Gray goldenrod	*Solidago nemoralis*	0.25	0.2%
Heath aster	*Symphyotrichum ericoides*	0.25	0.2%
Sky blue aster	*Symphyotrichum oolentangiense*	0.50	0.3%
Hoary vervain	*Verbena stricta*	1.50	1.0%
	Forbs	**24.75**	**16.2%**
	Total	**152.75**	

Wet Mix

Common Name	Scientific Name	Rate (oz/ac)	% of Mix (w/w)
Big bluestem	*Andropogon gerardii*	12.00	8.0%
Fringed brome	*Bromus ciliatus*	4.00	2.7%
Bluejoint	*Calamagrostis canadensis*	0.50	0.3%
Canada wild rye	*Elymus canadensis*	36.00	24.1%
Virginia wild rye	*Elymus virginicus*	48.00	32.2%
Switchgrass	*Panicum virgatum*	12.00	8.0%
Indian grass	*Sorghastrum nutans*	12.00	8.0%
Prairie cordgrass	*Spartina pectinata*	3.50	2.3%
	Grasses	**128.00**	**85.7%**
Wooly sedge	*Carex pellita*	0.50	0.3%
Tussock sedge	*Carex stricta*	0.50	0.3%
Fox sedge	*Carex vulpinoidea*	1.00	0.7%
Dark green bulrush	*Scirpus atrovirens*	0.25	0.2%
Woolgrass	*Scirpus cyperinus*	0.10	0.1%
	Sedges and Rushes	**2.35**	**1.6%**
Canada anemone	*Anemone canadensis*	1.00	0.7%
Marsh milkweed	*Asclepias incarnata*	2.00	1.3%
Common beggarticks	*Bidens frondosa*	2.00	1.3%
Canada tick trefoil	*Desmodium canadense*	2.00	1.3%
Common boneset	*Eupatorium perfoliatum*	0.25	0.2%
Grass-leaved goldenrod	*Euthamia graminifolia*	0.25	0.2%
Spotted joe-pye weed	*Eutrochium maculatum*	0.50	0.3%
Pale-spiked lobelia	*Lobelia spicata*	0.10	0.1%
American water horehound	*Lycopus americanus*	0.50	0.3%
Wild bergamot	*Monarda fistulosa*	1.00	0.7%
Virginia mountain mint	*Pycnanthemum virginianum*	0.25	0.2%
Black-eyed Susan	*Rudbeckia hirta*	4.00	2.7%
Marsh hedgenettle	*Stachys palustris*	1.00	0.7%
Purple meadow-rue	*Thalictrum dasycarpum*	1.00	0.7%
Bunched ironweed	*Vernonia fasciculata*	1.00	0.7%
Culver's root	*Veronicastrum virginicum*	0.10	0.1%
Golden alexanders	*Zizia aurea*	2.00	1.3%
	Forbs	**18.95**	**12.7%**
	Total	**149.3**	

Appendix 2. Minnesota Prohibited Noxious Weeds

Eradicate. *All above- and below-ground parts of the plant must be destroyed.*	
Common Name	**Scientific Name**
Palmer amaranth	*Amaranthus palmeri*
Oriental bittersweet	*Celastrus orbiculatus*
Diffuse knapweed	*Centaurea diffusa*
Brown knapweed	*Centaurea jacea*
Yellow star thistle	*Centaurea solstitialis*
Meadow knapweed	*Centaurea x moncktonii*
Poison hemlock	*Conium maculatum*
Black swallow-wort	*Cynanchum louiseae*
Grecian foxglove	*Digitalis lanata*
Common teasel	*Dipsacus fullonum*
Cut-leaved teasel	*Dipsacus laciniatus*
Giant hogweed	*Heracleum mantegazzianum*
Japanese hops	*Humulus japonicus*
Dalmatian toadflax	*Linaria dalmatica*
Control. *Effort must be made to prevent the spread, maturation, and dispersal of any propagating parts.*	
Common Name	**Scientific Name**
Common barberry	*Berberis vulgaris*
Narrowleaf bittercress	*Cardamine impatiens*
Plumeless thistle	*Carduus acanthoides*
Spotted knapweed	*Centaurea stoebe*
Canada thistle	*Cirsium arvense*
Leafy spurge	*Euphorbia esula*
Purple loosestrife	*Lythrum salicaria*
Wild parsnip	*Pastinaca sativa*
Common tansy	*Tanacetum vulgare*

Appendix 3. Additional Problem Weeds to Remove

Plant Group & Priority	Common Name	Scientific Name
Top Priority Grasses to Remove	Smooth brome grass	*Bromus inermis*
	Reed canary grass	*Phalaris arundinacea*
	Giant reed	*Phragmites australis*
	Kentucky bluegrass	*Poa pratensis*
Top Priority Forbs to Remove	Garlic mustard	*Alliaria petiolata*
	Musk thistle	*Carduus nutans*
	Bull thistle	*Cirsium vulgare*
	Crown vetch	*Securigera varia*
	Birds-foot trefoil	*Lotus corniculatus*
	White sweet clover	*Melilotus alba*
	Yellow sweet clover	*Melilotus officinalis*
Second Priority Grasses to Remove	Amur silver grass	*Miscanthus sacchariflorus*
Second Priority Forbs to Remove	Creeping Charlie	*Glechoma hederacea*
	Butter and eggs	*Linaria vulgaris*
	Japanese knotweed	*Polygonum cuspidatum*
	Perennial sow thistle	*Sonchus arvensis*
	Cow vetch	*Vicia cracca*
	Hairy vetch	*Vicia villosa*
Any Tree, Shrub, or Vine Outside the Screening Plantings		

Appendix 4. Native Background Vegetation Memorandum

MEMORANDUM

To: Melissa Schmit, Geronimo Energy

From: Benjamin Staehlin and Kim Chapman, Applied Ecological Services, Inc.

Date: April 22, 2019

Re: Regal Solar Energy Facility - Defining native background vegetative cover for site-appropriate vegetation and environmental conditions

Background Information

The Minnesota Pollution Control Agency (MPCA) has recently updated the language for their Stormwater Pollution Prevention Plan (SWPPP) guidance. In order for the Permittee to file a Notice of Termination, informing the MPCA that the SWPPP has been completed, one of the requirements states, "At least 90 percent (by area) of all originally proposed construction activity has been completed and permanent cover established on those areas." In Appendix B, under the definition of "permanent cover", the guidance says, "A uniform perennial vegetative cover (i.e. evenly distributed, without large bare areas) with a density of 70 percent of the native background vegetative cover for the area must be established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures." However, this guidance does not establish a standard for native background vegetative cover. Communications with the MPCA indicate that their assumption is that the default native background vegetative cover for any area is 100 percent, and any change to that number must be justified by the party submitting the permit. The intent of this memo is to examine the site conditions for the Regal Solar Energy Facility ("Regal") and determine the appropriate native background vegetative cover for the site.

The Regal Solar Energy Facility is proposed to be constructed in Benton County in central Minnesota. The proposed site is located just east of the Mississippi River floodplain on land that is currently used for agriculture. The predominant soils at the site, according to the USGS, are Isan sandy loams. Prior to widespread agricultural land clearing in the area, these soils support a thinly-treed plant community with brush and patchy to sparse ground layer vegetation. General Land Survey records describe the landscape on and around such soils as "barrens", "oak openings", and "brush prairie".

Based on information provided by the Natural Resources Conservation Service (NRCS) of Benton County and by the US Fish and Wildlife Service (USFWS), the historical plant community association in the area where Regal will be located is "Barrens Oak Savanna". Descriptions for the understory layer in this habitat include "The ground layer is mostly composed of prairie grasses and forbs, but their cover is patchy, with bare ground in between…" (Wovcha et al., 1995) and "Vegetation is often less than 100 percent, with bare sand exposed among the plants" (MNDNR, 2005). This description is consistent with the historical records and the soils on site and indicates that, if historic conditions existed, the ground layer would consist of a mosaic of sand and dry prairie vegetation. Describing the Southern Dry Savannas, which include Barrens Oak Savannas, the Minnesota Department of Natural Resources (MNDNR) goes on to say, "Graminoid cover is patchy to continuous (25-100 percent)….Forb cover is sparse to patchy (5-50 percent)."

These representative photographs are from the Helen Allison Savanna SNA, located about 75 miles to the southeast in Anoka County. The first photo has a fairly uniform herbaceous layer of approximately

80-90 percent vegetation cover, but the second photo shows only patches of permanent vegetation with significant areas of exposed sand. Thus, the range of ground layer vegetation cover described in the publications cited above are consistent with the photos of actual locations where Barrens Oak Savanna occurs.

Recommended Target Native Background Vegetation Percent

According to the MNDNR, the percent of herbaceous ground cover in Southern Dry Savannas, including the Barrens Oak Savanna habitat native to Benton County, ranges from 30-100 percent. With no existing remnant habitat in the area to survey, we propose adopting 65 percent, the midpoint of this range, as the native background vegetative cover for the area. For attainment of permanent cover, as defined by the SWPPP guidance, the site would therefore be required to achieve a uniform perennial vegetative cover equal to 70 percent of the native background vegetative cover, which would be 45 percent (70 percent of 65 percent) for the Regal Solar Energy Facility.

References

Minnesota Department of Natural Resources. 2005. Field guide to the native plant communities of Minnesota: The eastern broadleaf forest province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. MNDNR, St. Paul, MN.

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