Vegetation Management Plan

Boswell Solar Project, Itasca County, Minnesota

Minnesota Power

December 2024

Vegetation Management Plan

December 2024

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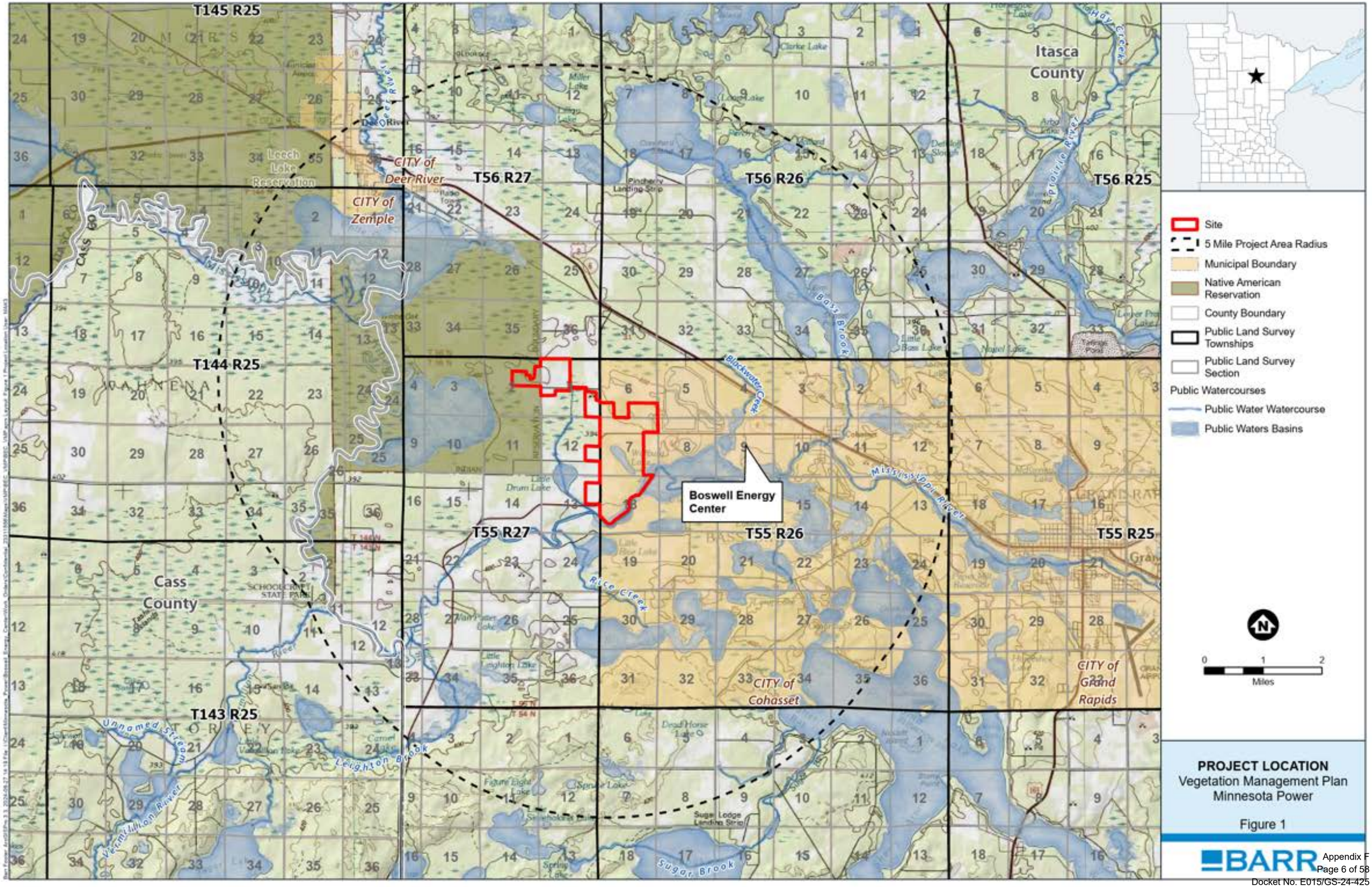
Abbreviations

AA	Assessment Area
BWSR	Minnesota Board of Water and Soil Resources
DNR	Minnesota Department of Natural Resources
IPP	independent power producer
MBS	Minnesota Biological Survey
MDA	Minnesota Department of Agriculture
MW	megawatt
NPC	native plant community
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
PLSS	Public Land Survey System
Project	Boswell Solar Project
PV	photovoltaic
PWI	Public Water Inventory
SBS	Sites of Biodiversity Significance
SWPPP	Stormwater Pollution Prevention Plan
VMP	Vegetation Management Plan
VMU	Vegetation Management Unit

1 Executive Summary

This Vegetation Management Plan (VMP) outlines measures to meet the vegetation management objectives and goals for the Minnesota Power solar generation facility portion of the Boswell Solar Project (Project). The Project involves construction of an up to 85-megawatt (MW) photovoltaic (PV) solar energy generating facility partially in the City of Cohasset, Itasca County, Minnesota (Figure 1). Minnesota Power will construct the Project within the 1,344.5-acre Site (Figure 1). Through implementation of this VMP, Minnesota Power will establish native perennial vegetation that is compatible with Project operations and maintenance needs, while improving the soils and benefiting native pollinators.



PROJECT LOCATION
Vegetation Management Plan
Minnesota Power

Figure 1

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1.1 Broad Vegetation Goals

This VMP follows best practices for establishment of native vegetation based on guidance from the BWSR and Minnesota Department of Commerce (Reference (1)). Minnesota Powers' primary vegetation management goals for this site are as follows; the objectives associated with each Goal are described further in Section 4:

- Goal 1: Establishment of diverse, native perennial vegetation over 70 percent of the plantable areas within the Site (this area would not include roads and infrastructure; Minnesota Power will determine the final plantable area at 90% design).
    - *Objective 1a*. Quickly establish vegetation to minimize the duration and extent of bare soil.
    - *Objective 1b.* Design native-dominant seed mixes appropriate for this region and expected conditions with high diversity of grasses and forbs.
- Goal 2: Establish vegetation compatible with the Project operations and minimize maintenance requirements and costs.
    - *Objective 2a.* Use primarily native species within the arrays that are short-statured and will not impede or shade solar panels and will not obstruct maintenance and access.
    - *Objective 2b*. Establish plant species that do not require extensive maintenance, provide complete cover, and minimize invasion by tall or otherwise undesirable species which may interfere with panels and equipment.
- Goal 3: Provide soil stability and improve soil health over the duration of the Project while also benefiting native pollinators.
    - *Objective 3a.* Use plant species that provide habitat and nectar sources throughout the growing season to support native pollinators.
    - *Objective 3b.* Use diverse native plant species that stabilize soils and improve soil health and carbon sequestration with their deep and varied root structures.
    - *Objective 3c.* Implement a long-term management plan using integrated vegetation management techniques and emphasizing regular maintenance and monitoring to minimize the need for widespread herbicide applications and height reduction mowing.
- Goal 4: Minimize invasive species, noxious weeds, and other undesirable species in the Site.
    - *Objective 4a.* Plan for long-term monitoring and maintenance to quickly detect new infestations and effectively control undesirable species.
    - *Objective 4b*. Install and selectively manage for desirable plant species which are competitive and reduce available space for potential invasive, noxious, and other undesirable plant species.

2 Site Description

2.1 Project Location

Minnesota Power will construct, own, and operate the Project consisting of an 85-megawatt (MW) photovoltaic (PV) solar energy generating facility in the city of Cohasset, the Deer Lake unorganized territory, Leech Lake Band of Ojibwe Reservation, and the following Public Land Survey System (PLSS) sections:

- Sections 1-2 and 12-13 of Township 55 North, Range 27 West
- Sections 6-7 and 18 of Township 55 North, Range 26 West

The Project is generally north of the Mississippi River, west of Blackwater Lake, south of US-2, and east of County Road 11. The Project location includes agricultural land, wetlands, and forested areas. Participating parcels are shown on Figure 3.

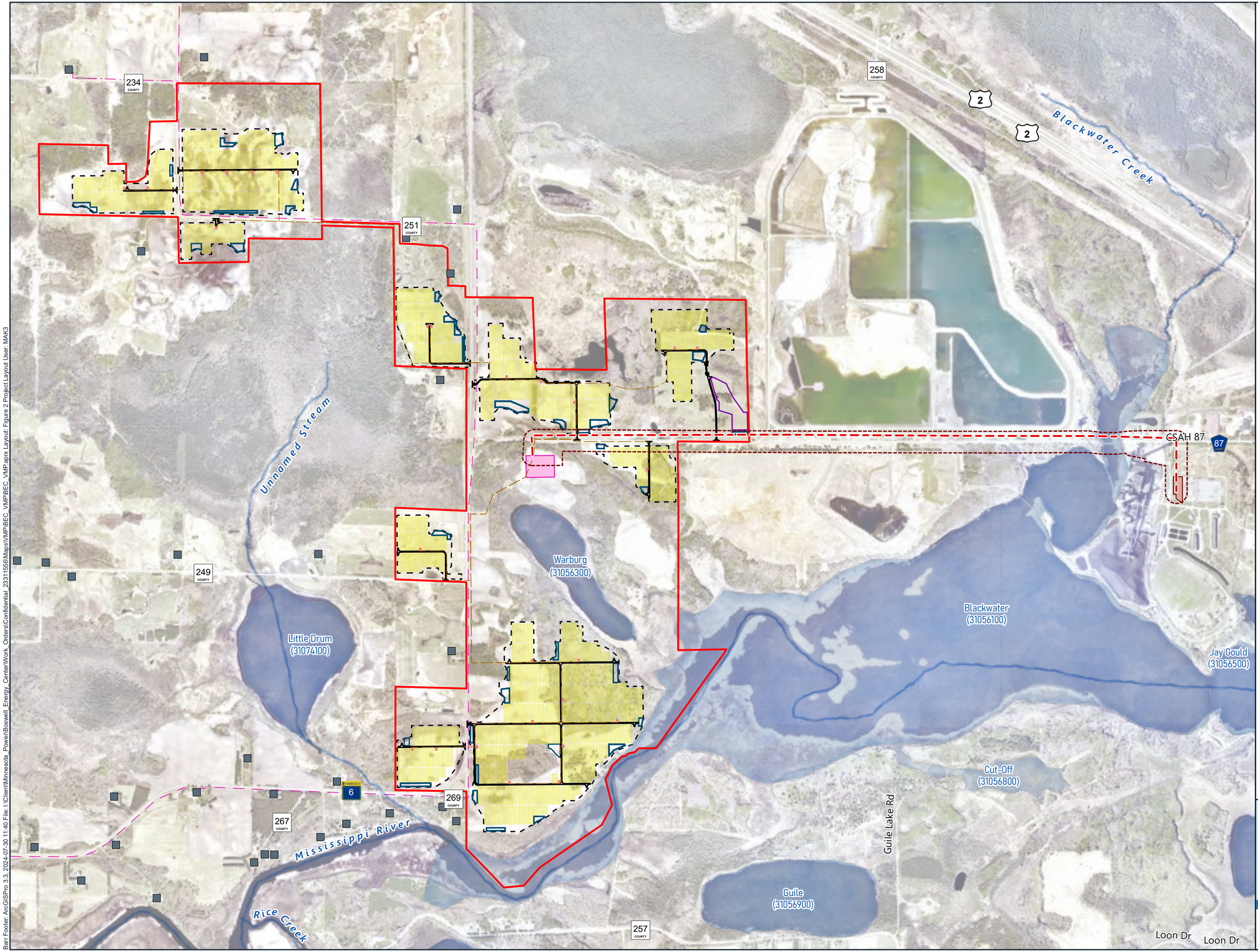
Minnesota Power will construct the following major components, systems, and associated facilities within the 1,344.5-acre Site (Figure 2):

- Single-axis tracking PV arrays installed on driven piles
- Inverters and medium-voltage step-up transformers
- Electrical collection line cables
- Project substation (Warburg Lake Substation)
- Step-up transformers
- Metering equipment
- Supervisory Control and Data Acquisition (SCADA) systems
- Gen-Tie Line
- Boswell 230-kV Substation Interconnection
- Gravel access roads
- Security fencing and gates
- Stormwater management system basins
- Temporary laydown yard
- Communication shelter
- Meteorological stations

The Project will also include construction of a 2.45 mile long 230 kilovolt generation tie line (Gen-Tie Line) and expansion of the existing Boswell substation that are not part of this VMP. Minnesota Power will manage vegetation in these areas consistent with current conditions.

During construction activities, the Contractor will use the laydown area to stage equipment and for temporary construction-related needs. Minnesota Power may use a permanent laydown area during operation of the Project. Minnesota Power will update this VMP to incorporate the Project design plan as an attachment when available. Plans and maps will include the following:

- Detailed layout and plan dimensions of proposed construction elements
- Detailed site grading plan including location of any relocated topsoil/subsoil
- Provide a map that locates all the identified features that could affect vegetation establishment and management
- Profile and detail drawing(s) of all proposed construction elements (solar infrastructure, detention ponds, drainage, fencing, roads, etc.) including dimensions, elevations, and grades as applicable
- Construction notes on plans (as needed) to allow for accurate interpretation of drawings and to supplement construction specifications, methods and materials specification
- Cut and fill map to show existing and proposed contours



Site
Route Width
Gen-Tie Line
Dwelllings
Access Roads
Laydown Yard
Inverters
Overhead Powerlines
Security Fence
Stormwater Basin
Underground Collection
Proposed Solar Array
Warberg Lake Substation Area
BEC 2030kV Expanson Substation

Public Watercourses

Public Water Watercourse
Public Ditch/Altered Natural Watercourse
Public Waters Basins

N

0 1,500 3,000
Feet

Imagery: 2023 Itasca County

PROJECT LAYOUT
Vegetation Management Plan
Minnesota Power

Figure 2

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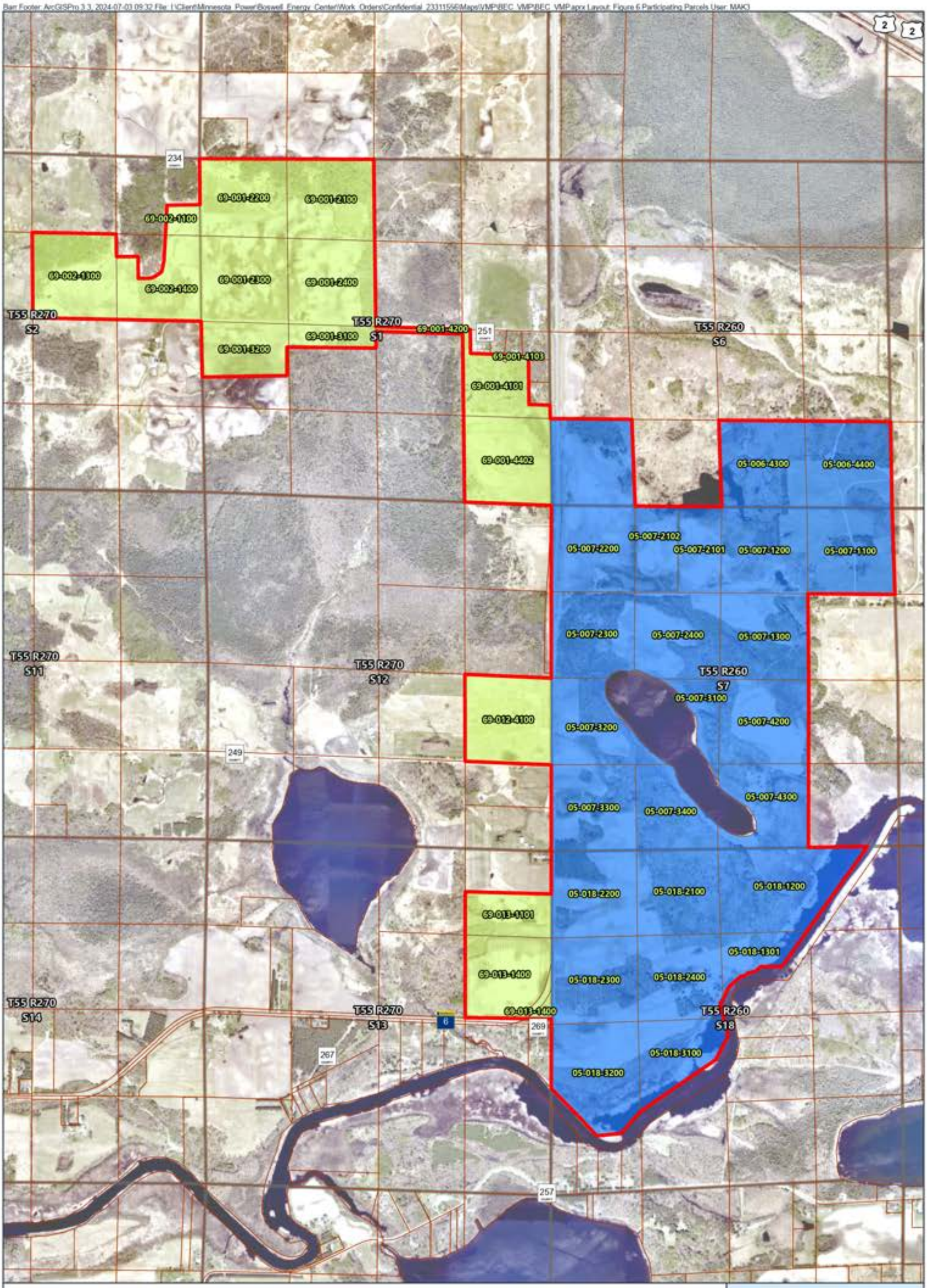
Barr Footer: ArcGISPro 3.3, 2024-07-30 11:40 File: I:\Client\Minnesota_Power\Boswell_Energy_Center\Work_Orders\Confidential_23311556\Maps\VMP\BEC_VMP\BEC_VMP.aprx Layout: Figure 2 Project Layout User: MAK3



PARTICIPATING PARCELS
Vegetation Management Plan
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Figure 3

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2.2 Vegetation

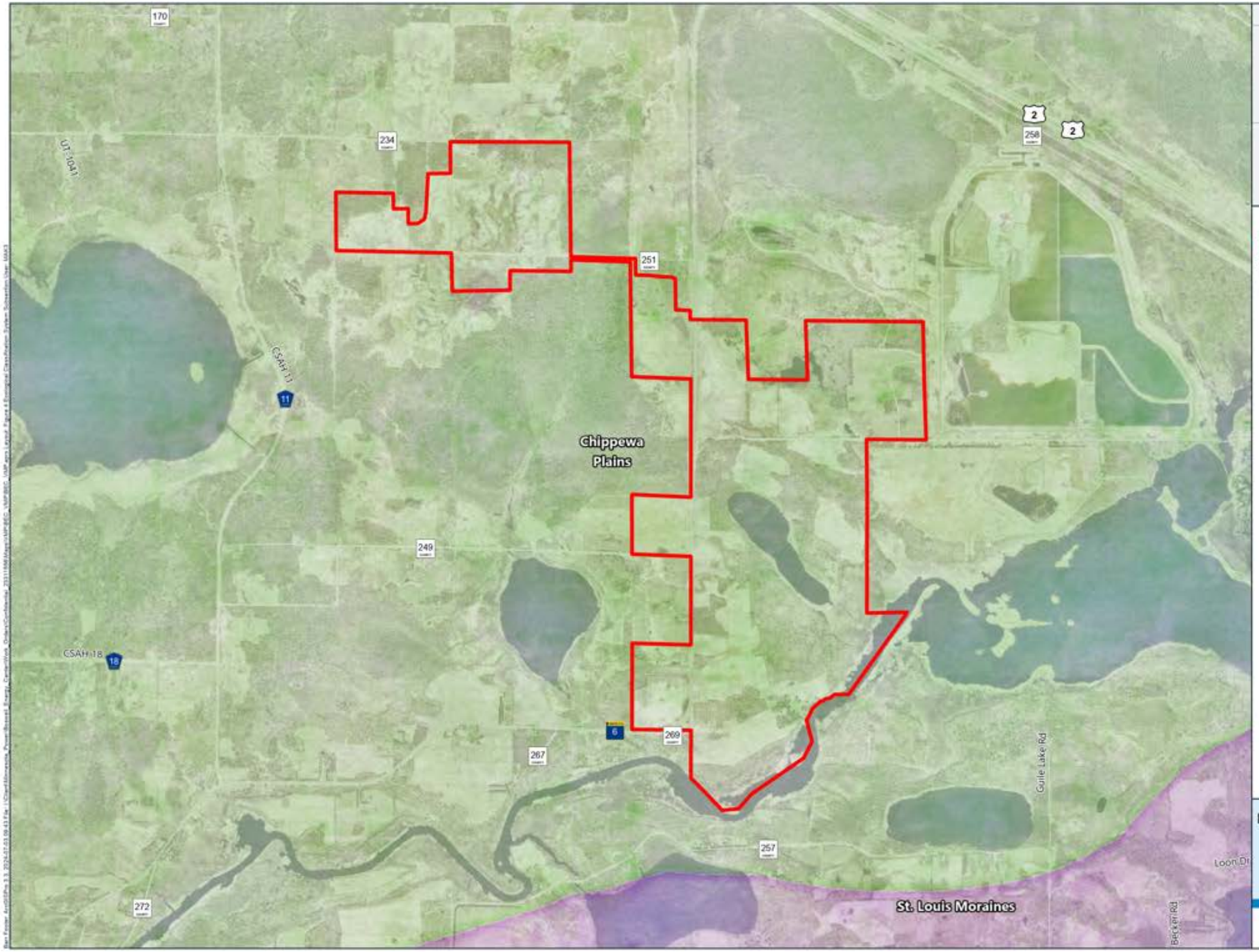
According to the Minnesota Department of Natural Resources Ecological Classification System, the Site is within the Chippewa Plains (212Na) Subsection in the Northern Minnesota Drift and Lake Plains (212N) Section of the Eastern Broadleaf Forest Province (Figure 4) (reference (2)). This Section has complex surface geology, formed over many episodes of glaciation. It is characterized by deep (200-600 feet) glacial deposits in outwash plains, lake plains, till plains, outwash channels, moraines, and drumlin fields. The patterns of vegetation in the Section reflect the complex and patchy distribution of these glacial deposits. Mesic forest of sugar maple, basswood, paper birch, aspen, and northern red oak are widespread (reference (3)).

Land use within and adjacent to the Site is predominantly agricultural (Figure 5). Over a ten-year period (2014 to 2023), soybeans have been the primary cultivated crop within the Site (Table 1) (references (4), (5), (6), (7), (8), (9)). Other agricultural land cover types have included spring wheat, grass/pasture, corn, and alfalfa. The Site contains areas designated as Prime Farmland, Farmland of Statewide Importance, and Prime Farmland if drained.

Table 1 Primary Land Cover for the Site

Year	Primary Land Cover
2023	Soybeans
2022	Soybeans
2021	Soybeans
2020	Soybeans
2019	Soybeans
2018	Spring Wheat
2017	Soybeans
2016	Soybeans
2015	Soybeans
2014	Soybeans

Wetlands, forested areas, and waterbodies are also within the Site (Figure 6). Minnesota Power will incorporate photos of current site conditions in Attachment 3.



ECOLOGICAL CLASSIFICATION SYSTEM SUBSECTION
Vegetation Management Plan
Minnesota Power

Figure 4

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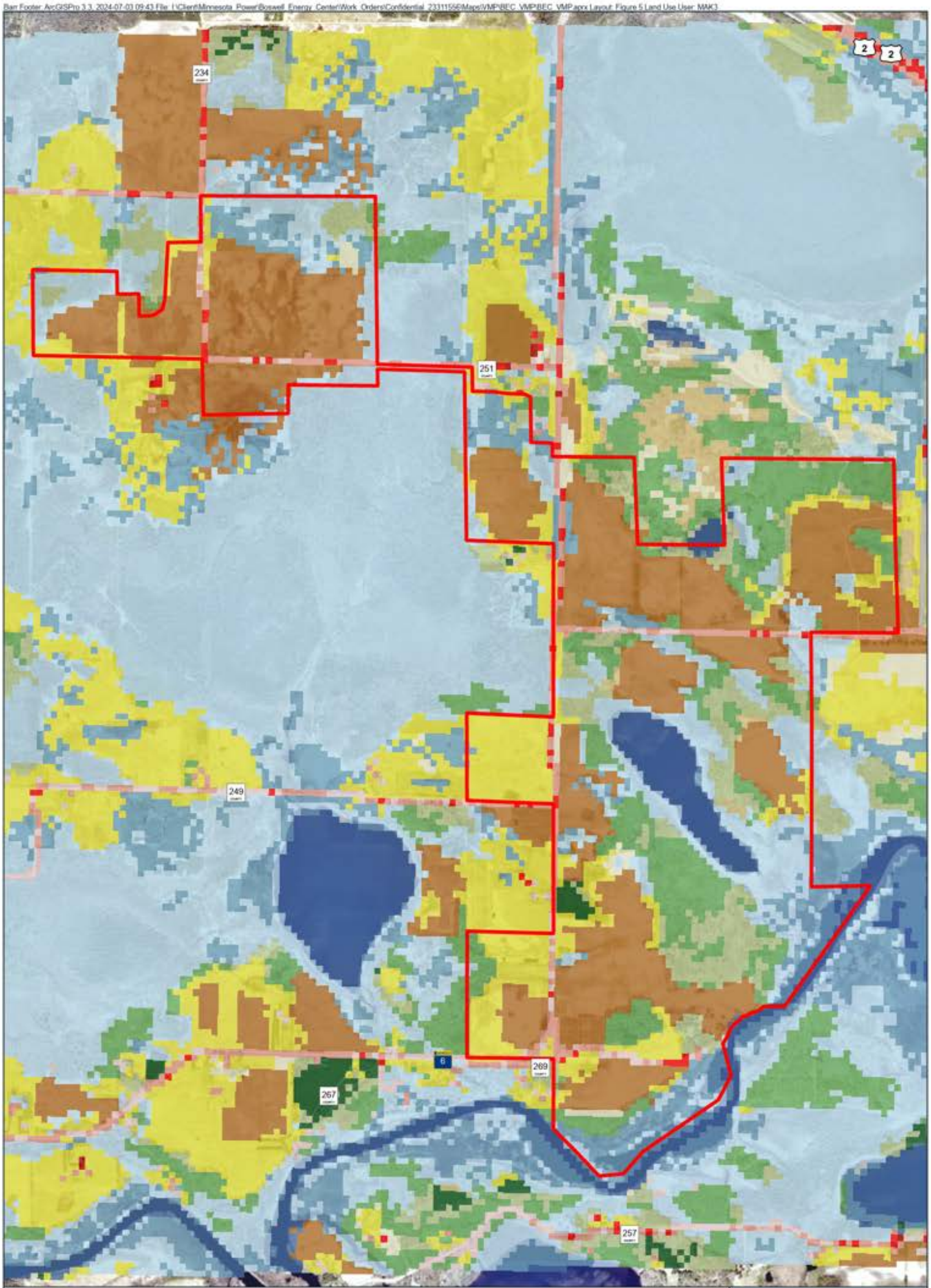

Site
Land Use, NLCD 2021
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands

N

0 1,000 2,000
Feet

Imagery: 2023 Itasca County

LAND USE
Vegetation Management Plan
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Figure 5

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234
2
2
251
249
Little Blum (3307430)
Warburg (3105300)
Blackwater (3105100)
Unnamed Stream
6
269
267
Mississippi River
Rice Creek
Mississippi River
257
Little Rice (3107600)
Gulo (3105900)

Site
Cropland Data Layer 2023
Corn
Soybeans
Spring Wheat
Rye
Oats
Alfalfa
Other Hay/Non Alfalfa
Dry Beans
Potatoes
Other Crops
Sod/Grass Seed
Fallow/Idle Cropland
Open Water
Developed/Open Space
Developed/Low Intensity
Developed/Med Intensity
Developed/High Intensity
Barren
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrubland
Grassland/Pasture
Woody Wetlands
Herbaceous Wetlands
Public Watercourses
Public Water Watercourse
Public Waters Basins

N
0 1,000 2,000
Feet

Imagery: 2023 Itasca County

LAND COVER
Vegetation Management Plan
Minnesota Power

Figure 6

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Based on the Wetlands and Waters Survey Report completed in March 2023, the following wetland vegetation identified within the Site (reference (10), Figure 6).

- Seasonally flooded basin wetlands with undisturbed vegetation:
  - reed canary grass (*Phalaris arundinacea*)
  - barnyard grass (*Echinochloa crus-galli*)
  - prairie cordgrass (*Spartina pectinata*)
  - dark-green bulrush (*Scirpus atrovirens*)
  - yellow nutsedge (*Cyperus esculentus*)
  - late goldenrod (*Solidago gigantea*)
- Seasonally flooded basin wetlands within agricultural fields:
  - soybeans (*Glycine max*) or corn (*Zea mays*)
  - yellow bristle grass (*Setaria pumila*)
  - fall panic grass (*Panicum dichotomiflorum*)
  - biennial wormwood (*Artemisia biennis*)
  - barnyard gras
  - yellow nutsedge
- Wet meadow wetlands:
  - dark-green bulrush
  - reed canary grass
  - prairie cordgrass
  - various sedges (*Carex* spp.)
- Shallow marsh wetlands:
  - reed canary grass
  - dark-green bulrush
  - cattails (*Typha* spp.)
- Shrub swamp wetlands:
  - sandbar willow (*Salix interior*)
  - black willow (*Salix nigra*)
  - speckled alder (*Alnus incana*)
  - balsam fir (*Abies balsamea*)
  - reed canary grass
  - dark-green bulrush
  - prairie cordgrass
  - various sedges
  - American larch (*Larix laricina*)
  - black ash (*Fraxinus nigra*)
- Seasonally flooded forested wetlands:
  - black ash
  - quaking aspen (*Populus tremuloides*)
  - balsam poplar (*Populus balsamifera*)
  - black spruce (*Picea mariana*)
  - balsam fir
  - various willows
  - speckled alder
  - buckthorn (*Rhamnus* spp.)
  - ash-leaf maple (*Acer negundo*)
  - reed canary grass

    - late goldenrod
    - jewelweed (*Impatiens capensis*)

The following information is taken from the Wetlands and Waters Survey Report completed by Tetra Tech, Inc. on March 9, 2023 (reference (11)). These vegetation species were identified on land owned by Minnesota Power in the Site (Figure 3) during a site visit on October 4-12, 2022.

- Seasonally flooded basin wetlands with undisturbed vegetation:
    - reed canary grass
    - dark-green bulrush
    - uptight sedge (*Carex stricta*)
    - late goldenrod
- Seasonally flooded basin wetlands within agricultural fields:
    - soybeans
    - fall panic grass
    - yellow bristle grass
    - smooth crabgrass (*Digitaria ischaemum*)
    - bog yellowcress (*Rorippa palustris*)
    - Fraser's St. John's-wort
- Wet meadow wetlands:
    - dark-green bulrush
    - reed canary grass
- Shallow marsh wetlands (either seasonally flooded or continuously saturated):
    - dark-green bulrush
    - cattails
- Shrub-carr wetlands:
    - sandbar willow
    - speckled alder
    - buckthorn
    - reed canary grass
    - late goldenrod
    - various sedges
    - black ash
    - balsam poplar
    - quaking aspen
- Seasonally flooded forested wetlands:
    - black ash
    - quaking aspen
    - balsam poplar
    - red maple (*Acer rubrum*)
    - speckled alder
    - buckthorn
    - common winterberry (*Ilex verticillata*)
    - reed canary grass
    - dark-green bulrush
    - various sedges
    - late goldenrod
    - jewelweed

- Hardwood swamp wetlands:
    - black ash
    - balsam fir
    - quaking aspen
    - speckled alder
    - American elm (*Ulmus americana*)
    - reed canary grass
    - dark-green bulrush
    - fringed brome (*Bromus ciliatus*)
    - fowl blue grass (*Poa palustris*)
- Upland agricultural fields:
    - soybeans
- Upland unmanaged grassland and wooded areas:
    - quaking aspen
    - black ash
    - balsam fir
    - red maple
    - northern white oak (*Quercus alba*)
    - American basswood (*Tilia americana*)
    - beaked hazelnut (*Corylus cornuta*)
    - black ash
    - speckled alder
    - common winterberry
    - nanny-berry (*Viburnum lentago*)
    - common red raspberry (*Rubus idaeus*)
    - horsetails (Equisetum spp.)
    - smooth brome (*Bromus inermis*)
    - slender wild rye (*Elymus trachycaulus*)
    - flat-stem blue grass (*Poa compressa*)
    - northern lady fern (*Athyrium angustum*)
    - ostrich fern (*Matteuccia struthiopteris*)
    - sensitive fern (*Onoclea sensibilis*)

Several of the species observed onsite during the site visits are invasive plants (reference (12)): reed canary grass, buckthorn, and smooth brome.

2.3 Land Use

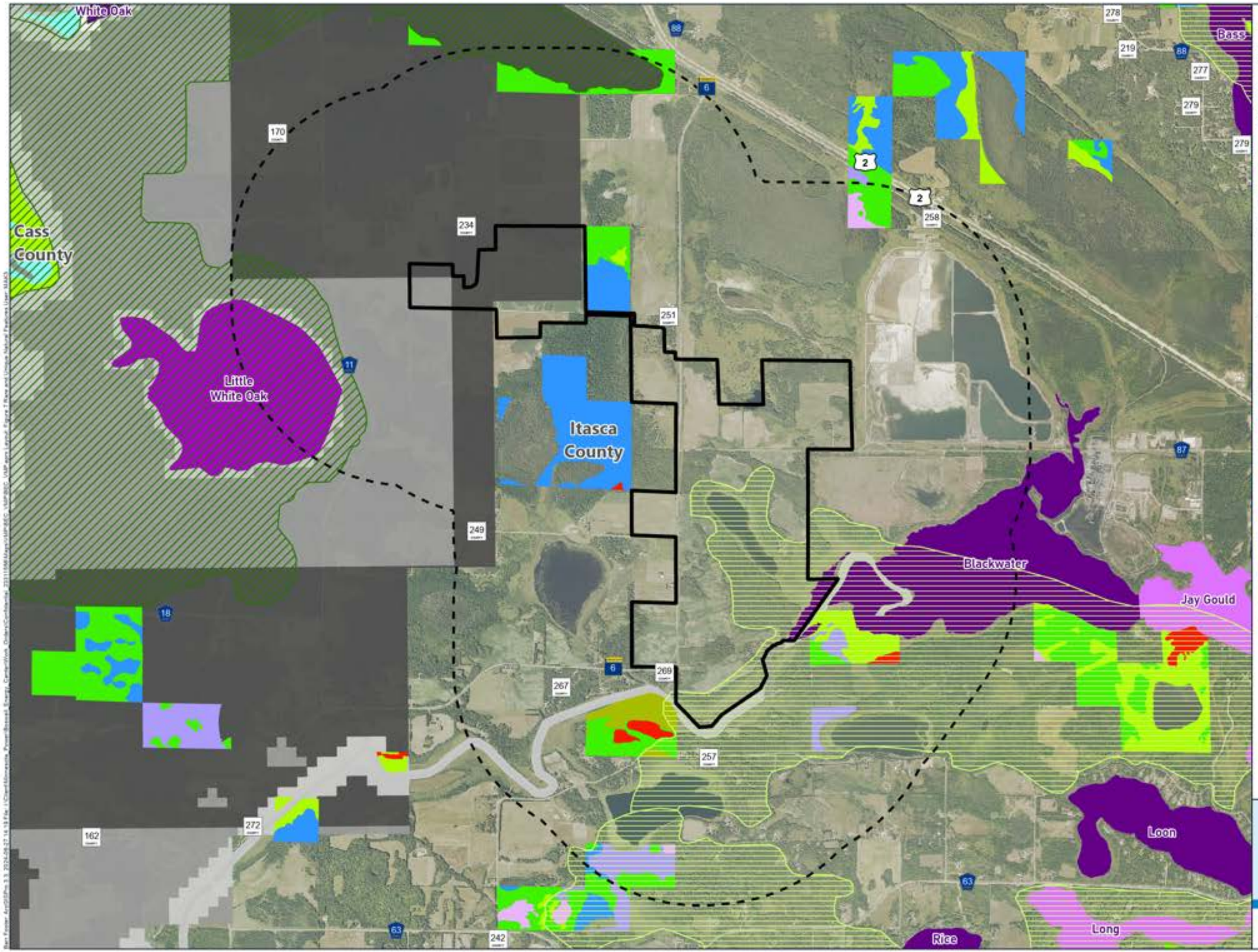
Land use within and adjacent to the Site is predominantly forested and agricultural (Figure 5). The Site includes mixed deciduous and evergreen forest with agricultural fields including cultivated crops, pastures, and agricultural related structures.

The most developed area near or within the Project is the city of Cohasset. Except for residences in the city of Cohasset, residences in the vicinity of the Site are primarily associated with farms. The major traffic routes in the area are US-2 which runs southeast and northwest, to the north of the Project, and MN-6, which runs north and south, across the Site.

Some lands designated as high value resources, as defined by the DNR issued Commercial Solar Siting Guidance, are present near the Site. Figure 7 provides the locations of the following within the Project vicinity:

- DNR Minnesota Biological Survey (MBS) mapped native plant communities (NPCs)
- DNR mapped Native Upland Prairie
- Sites of Biodiversity Significance (SBS) that are documented as having an MBS ranking of "below", "moderate", or "outstanding" within a 1-mile radius of the Site

These represent areas with more vegetation diversity compared to the surrounding agricultural areas. The implementation of this VMP will not impact the surrounding properties since management will be confined to the Site. Management of invasive weeds at the Site (Section 3.2) will reduce this invasive plant seed source for the surrounding area.



RARE AND UNIQUE NATURAL FEATURES
Site Permit Application
Minnesota Power

Figure 7

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2.4 Soils

According to the Soil Survey Geographic Database (SSURGO), 17 mapped soil units are in the Site. Figure 8 shows the distribution of the soil map units within the Site. Approximately one-third (31 percent) of the soil within the Site consists of the Wawina-Cedar Valley complex on 1 to 18 percent slopes. The dominant soil textures within the Site are sandy loam (34 percent) and loamy sand (26 percent). One quarter of the Site is mapped with soils classified as hydric or predominantly hydric (Table 2). Approximately half of the soils present within the Site are classified as well drained.

Minnesota Power will update this VMP prior to implementation if geotechnical survey results differ significantly from the NRCS data.

Placeholder for:

Table 2 Site Soil Characteristics

Soil Map Unit	Extent in Site (Ac)	Hydric Soil (%) [1]	Drainage Class [2]	Depth of Topsoil (in)	Depth to Water Table (cm)	Frequency of Flooding [3]	Prime Farmland (Ac) [4]	Farmland of State Importance (Ac) [5]
Ashlake-Effie complex, 0 to 4 percent slopes	99.7	19	Somewhat poorly drained	0 to 1	45	None	99.7	0
Ashlake-Suomi complex, 1 to 8 percent slopes	22.4	5	Somewhat poorly drained	0 to 1	45	None	22.4	0
Bearville loamy sand	11.1	95	Poorly drained	0 to 2	15	None	0	0
Cowhorn-Onega-Sago, frequently ponded complex, 0 to 3 percent slopes	35.6	45	Somewhat poorly drained	0 to 5	45	None	0	0
Cutaway loamy sand, 0 to 8 percent slopes	289.4	5	Well drained	0	201	None	0	289.4
Effie-Ashlake-Effie, frequently ponded, complex, 0 to 2 percent slopes	122.1	81	Poorly drained	0 to 2	10	None	122.1	0
Hamre-Tacoosh-Effie complex, 0 to 1 percent slopes, frequently ponded	5.1	100	Very poorly drained	12 to 15	0	None	0	0
Histosols, ponded	16.7	95	Very poorly drained	0	0	None	0	0
Mooselake and Lupton soils, 0 to 1 percent slopes	50.4	100	Very poorly drained	0	0	None	0	0
Nebish loam, 1 to 8 percent slopes	12.1	4	Well drained	0 to 3	201	None	12.1	0
Redby loamy fine sand, 0 to 3 percent slopes	48.1	12	Somewhat poorly drained	0 to 5	50	None	0	0
Sago and Roscommon soils	58.3	90	Very poorly drained	0	0	None	0	0
Sandwick loamy fine sand	6.9	88	Poorly drained	0	15	None	0	0
Seelyeville-Bowstring association	48.9	95	Very poorly drained	0	0	Frequent	0	0
Tawas muck	12.0	90	Very poorly drained	0	0	None	0	0
Warba-Menahga complex, 10 to 25 percent slopes	3.9	6	Well drained	0 to 1	201	None	0	0
Water	83.2	Not Applicable						
Wawina-Cedar Valley complex, 1 to 18 percent slopes	418.6	10	Well drained	0 to 2	201	None	0	0

[1] Soils that are classified as hydric (100 percent) and predominantly hydric (67-99 percent) by Soil Survey Geographic Database.
[2] WD = well drained, MWD = moderately well drained, SPD = somewhat poorly drained, PD=poorly drained, VPD = very poorly drained.
[3] Flooding is the temporary inundation of an area caused by overflowing streams or runoff from adjacent slopes. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.
[4] Includes soils that are classified as “prime farmland” and “prime farmland if drained and/or protected” by the Natural Resources Conservation Service (NRCS).
[5] Includes soils that are classified as “farmland of statewide importance” by the NRCS.

- Site
- Soil Map Unit
- 1031,Histosols, ponded
- 116,Redby loamy fine sand, 0 to 3 percent slopes
- 32B,Nebish loam, 1 to 8 percent slopes
- 620B,Cutaway loamy sand, 0 to 8 percent slopes
- 625,Sandwick loamy fine sand
- 627,Tawas muck
- 655,Bearville loamy sand
- 797,Mooselake and Lupton soils, 0 to 1 percent slopes
- 798,Sago and Roscommon soils
- 799,Seelyeville-Bowstring association
- 803D,Warba-Menahga complex, 10 to 25 percent slopes
- B238A,Cowhorn-Onega-Sago, frequently ponded complex, 0 to 3 percent slopes
- B240D,Wawina-Cedar Valley complex, 1 to 18 percent slopes
- B243A,Hamre-Tacoosh-Effie complex, 0 to 1 percent slopes, frequently ponded
- B606B,Ashlake-Effie complex, 0 to 4 percent slopes
- B616A,Effie-Ashlake-Effie, frequently ponded, complex, 0 to 2 percent slopes
- B626B,Ashlake-Suomi complex, 1 to 8 percent slopes
- W,Water

0 1,000 2,000
Feet

Imagery: 2023 Itasca County

NRCS MAPPED SOIL TYPES
Vegetation Management Plan
Minnesota Power

Figure 8

BARR

2.5 Topography

The Site generally slopes toward the south. Ground elevations in the Site range from approximately 1,370 to 1,280 feet above mean sea level (amsl) (Figure 9). Most of the Site has very gradual relief. However, a hill reaching 1,370 feet amsl is north of Warburg Lake. The lowest elevations are associated with wetlands and waterbodies that eventually drain to the Mississippi River, south of the Site.

Site
Surface Flow
10' Index Contour
1' Intermediate Contour

Surface Elevation Value

1,268.35 - 1,270	1,300.01 - 1,310	1,360.01 - 1,370
1,270.01 - 1,280	1,310.01 - 1,320	1,370.01 - 1,380
1,280.01 - 1,290	1,320.01 - 1,330	
1,290.01 - 1,300	1,330.01 - 1,340	
	1,340.01 - 1,350	
	1,350.01 - 1,360	

N

0 1,000 2,000
Feet

TOPOGRAPHY
Vegetation Management Plan
Minnesota Power

Figure 9

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2.6 Hydrology

The Site is within the Blackwater Lake-Mississippi River Watershed and generally slopes south toward Blackwater Lake and the Mississippi River. The DNR Public Water Inventory (PWI) identifies two public basins (Blackwater Lake and Warburg Lake) but not any public watercourses within the Site. According to the aquatic resources surveys conducted by Tetra Tech, Inc. in 2022 (references (10) and (12)) the Site contains four watercourses, five waterbodies, and 126 wetlands (Figure 10).Midwest Natural Resources (MNR) is completing additional field wetland delineation within the Site and along the Gen-Tie Line in the summer of 2024. A portion of the Site, north of the Mississippi River, is within the 100-year floodplain (Figure 10).

2.6.1 Drain Tile

Based upon site knowledge and site observations by the current landowners and land managers, there is no drain tile present within the Project area. Should drain tile be unexpectedly encountered at the site, Minnesota Power will utilize the following procedures to maintain, repair and replace drain tile within the Project area. These procedures are summarized as follows:

1. In areas where it is not possible to design solar arrays around existing private drain tile locations, Minnesota Power will take steps to maintain the integrity of the drainage system during and after construction. Minnesota Power will attempt to relocate tile that is anticipated to be in conflict with solar array installation or trenches (i.e., collection lines) around the conflict area.
2. Minnesota Power will attempt to identify, repair, or relocate drain tile(s) or drainage system(s) adversely affected to achieve the function and scope to its original size and capacity. Replacement or rerouting tile will occur during construction to maintain the integrity of the drainage lines.
3. Following completion of construction, Minnesota Power will inspect the Site after significant snow melt or rainfall events for evidence that tile systems are functioning adequately. If localized wet areas or standing water are present, it may be an indication the tile system is not operating as intended. In this situation, Minnesota Power will seek to remedy soil drainage conditions within a reasonable timeframe, considering weather and soil conditions.

2.6.2 Watercourses

Two unnamed streams (SC062 and SC073) are in the northern portion of the Site, and the Mississippi River (SC077) is along the southeastern boundary of the Site.

- SC062 is an unnamed intermittent stream (R4SBA) in the northwest portion of the Site. Approximately 8 inches of water was observed flowing from wetland (WC062) at a low rate to the southeast toward a large wetland complex (WC005) associated with Warburg Lake (LC066) and the Mississippi River (SC077).

- SC073 is an unnamed ephemeral stream (R4SBA) in the northern part of the Site. The stream was dry at the time of the survey. The stream was observed beginning at wetland (WC076) and extended to the south toward a large wetland complex (WC005) associated with Warburg Lake (LC066) and the Mississippi River (SC077).

One segment of the Mississippi River (R2UBH) was recorded as SC077 along the southeastern boundary of the Site. At the time of the survey, approximately 8 feet of water was observed within the main channel, which flowed from the southwest to the northeast at a moderate rate. Emergent wetland vegetation and

shrubs associated with a large wetland complex (WC005) were observed along the northern bank of SC077 within the Site.

2.6.3 Waterbodies

During the 2022 survey, Warburg Lake (LC066) was observed within the Site (Figure 10) and classified as L1UBH. Warburg Lake has a hydrologic connection to the Mississippi River (SC077) through a large wetland complex (WC005) to the southeast of the lake. In addition, four ponds were documented and observed to consist of excavated depressions. One pond (PA025) was documented in an upland area, had an estimated water depth of 1.5 feet, and was classified as PUBFx. The remaining 3 ponds (PA036.1, PA036.2, and PA036.3) were documented as part of a larger wetland complex (WA036), had estimated water depths of 2 feet, and were classified as PUBGx.

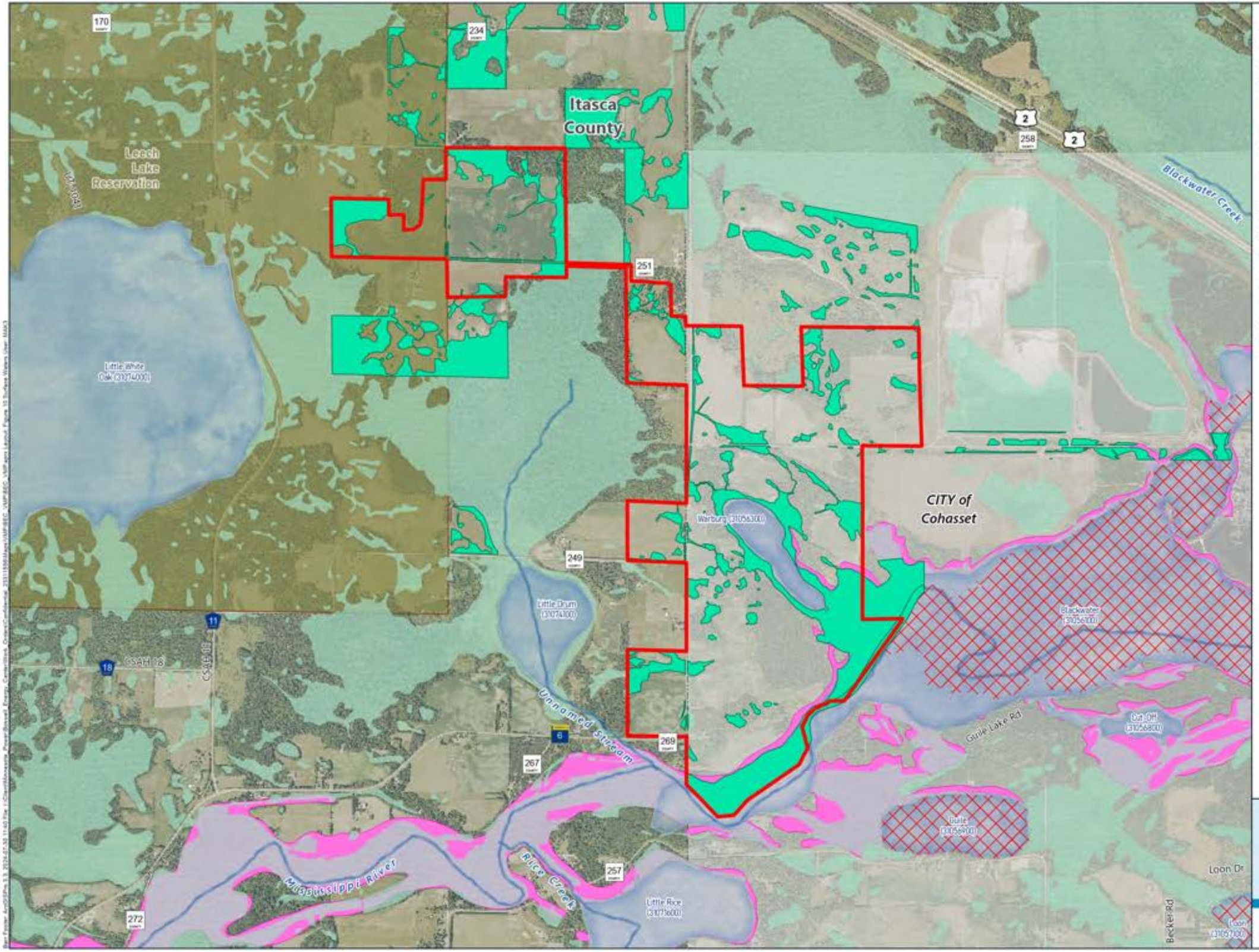
2.6.4 Wetlands

According to the survey, 126 wetlands were delineated within the Site (Figure 10). Of these, the following wetland types were identified:

- 68 seasonally flooded basins (Type 1)
- 9 wet meadow wetlands (Type 2)
- 2 shallow marsh wetlands (Type 3)
- 1 scrub swamp wetland (Type 6)
- 3 shrub-carr wetlands (Type 6)
- 2 hardwood swamp wetlands (Type 7)
- 41 wetland complexes of multiple wetland types

Most delineated wetlands on land owned by Minnesota Power were isolated depressional wetlands, isolated wetland complexes, or wetland complexes that connect to Warburg Lake and/or the Mississippi River. On the private-owned parcels, most Type 1, seasonally flooded basins were isolated depressional wetlands and wholly delineated within the Site boundaries. Hydric soils classifications are discussed further in Section 2.4.

The Project design as proposed would avoid permanently impacting delineated wetlands that are not actively cultivated.



SURFACE WATERS
Vegetation Management Plan
Minnesota Power

Figure 10

BARR

3 Vegetation Management Units

The Project layout includes several blocks of arrays that are divided by public roads, ditches, and infrastructure including access roads, collector lines, etc. Minnesota Power will seed and manage each of the blocks and consist of the same Vegetation Management Unit (VMU) types as defined below. Objectives for each management unit are detailed in Section 4. There are five different VMUs for this Project as shown in Figure 11 and described below; current land use in these areas is shown on Figure 5. The objectives for each Management Unit are listed in Section 4. The goals for each Management Unit are listed below.

1. **Pollinator Solar Array VMU** will be the array footprint including underneath panels and in array rows, and immediately surrounding equipment and roads within the arrays which includes currently actively cultivated wetlands.

    a. Seed with diverse and short-statured native species that should, under normal conditions, remain shorter than 30 inches tall and will include grasses, sedges, and forbs.

    b. Provide high-quality native prairie habitat and regularly maintain to prevent interference with operations, reduce thatch, and control undesirable plant species.

    c. Minimize soil disturbance and compaction during construction and employ soil handling best practices to avoid subsoil mixing.

    d. Properly prepare seedbeds (including decompaction, if necessary) for areas disturbed during construction, as discussed further below.

2. **Wetland VMU** will be in existing delineated wetlands throughout the Site.

    a. Construction will temporarily impact wetlands to facilitate the installation of above or below ground infrastructure but will return to pre-construction conditions. As such, they are a separate VMU. Minnesota Power does not intend to seed or actively manage natural wetlands except for the following bullets.

    b. Maintain existing vegetation to prevent noxious and undesirable species. Vegetation management will occur in the wetland VMU if noxious and undesirable species are present depending on the species and degree of establishment.

    c. Minimize soil disturbance and compaction and employ soil handling best practices to avoid subsoil mixing.

    d. Properly prepare seedbeds (including decompaction, if necessary) for areas disturbed during construction, as discussed further below.

3. **Surrounding Upland VMU** will be in existing upland areas throughout the Site and external to the Solar Array VMU.

    a. Construction may temporarily disturb these areas to facilitate the installation of above or underground infrastructure but will return to pre-construction conditions. As such, they are a separate VMU. Minnesota Power will seed these areas but does not intend to actively manage except for the following bullet. **Minnesota Power will select seed mixes for these locations in the 90% design.**

b. Maintain existing and/or seeded vegetation to prevent noxious and undesirable species. Vegetation management will occur in the surrounding upland VMUs if noxious and undesirable species are present depending on the species and degree of establishment.

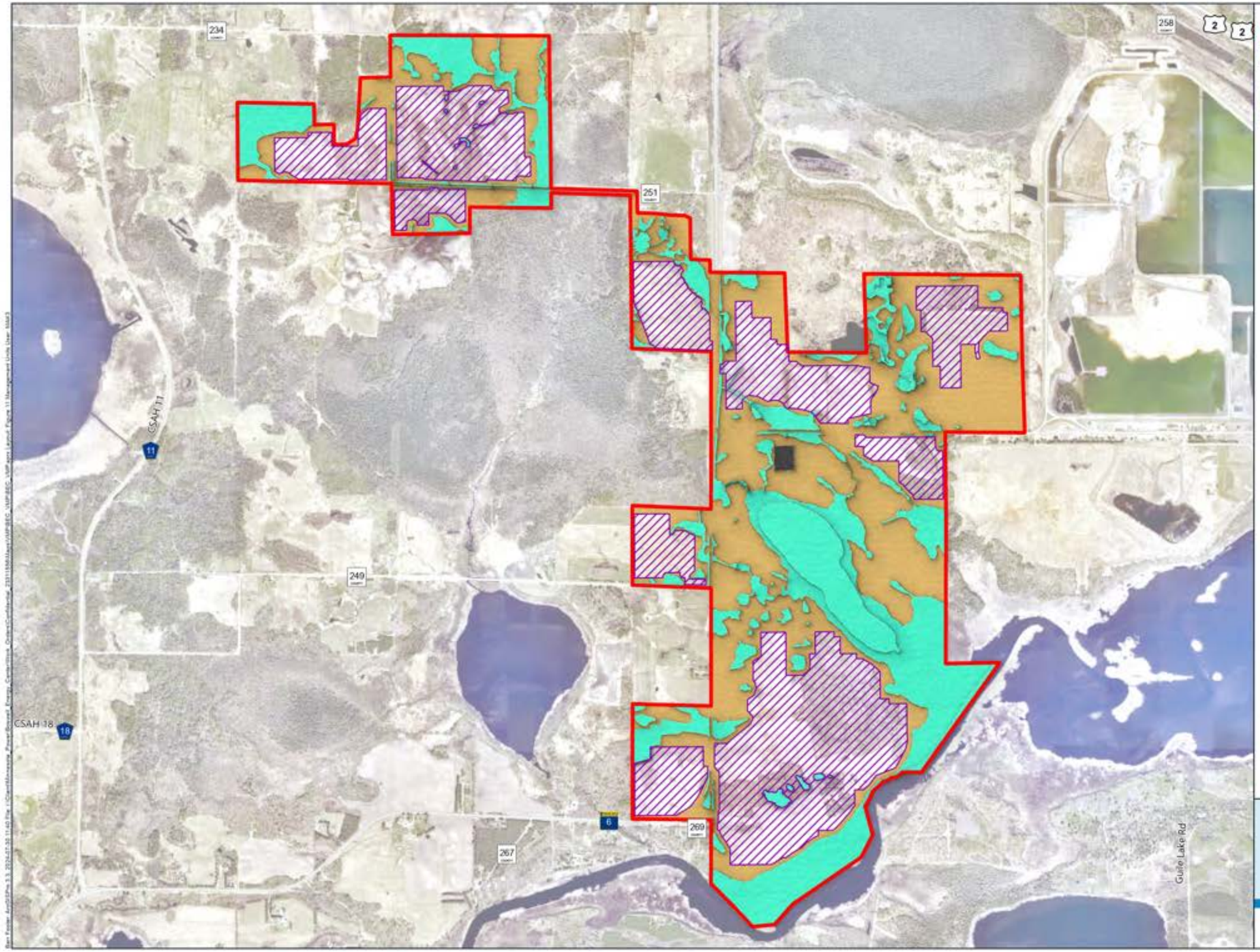
c. Minimize soil disturbance and compaction and employ soil handling best practices to avoid subsoil mixing.

d. Properly prepare seedbeds (including decompaction, if necessary) for areas disturbed during construction, as discussed further below.

4. **Impervious Surface VMU** will be in areas where infrastructure or impervious surface requires the absence of living vegetation within the Site.

    a. Areas that will require the absence of living vegetation, such as maintained roads or parking areas will be treated as a separate VMU. Minnesota Power will maintain these areas to prevent vegetation establishment to maintain access and visibility requirements.

5. **Open Water VMU** will be areas of open water within the Site. The Project will not disturb these areas and they are not part of this VMP.



VEGETATION MANAGEMENT UNITS
Vegetation Management Plan
Minnesota Power

Figure 11

BARR

4 Management Objectives

Minnesota Power will manage the Project to promote the establishment of diverse, native vegetation (Section 7). The following sections list the objectives to assess the successful implementation of this VMP and vegetation establishment, except for the Open Water VMU. These objectives were developed to be specific, measure-able, attainable, realistic and time-bound (Reference (1)).

Short-term objectives are intended to be during the site restoration and seed establishment phase of the Project (0-5 years) whereas the long-term objectives are intended to support the management strategies for after Year 5.

4.1 Pollinator Solar Array VMU

The objectives below apply to the Solar Array VMU as shown on Figure 11 and are intended to provide specificity, measure-ability, attainability, reality and schedule (Reference (1)). The objectives detailed below are intended to promote achievement of the Vegetation Performance Standards listed in Section 8.1.

Short-term objectives for the Pollinator Solar Array VMU (within the first 5 years of management):

- Goal 1: Establishment of diverse, native perennial vegetation over 70 percent of the plantable areas within the Site (this area would not include roads and infrastructure; **Minnesota Power will determine the final plantable area at 90% design**).
    - *Objective 1a*. Minnesota Power will employ the site preparation techniques and seed installation measures (Section 6) **within X days of X activity** per their SWPPP requirements to minimize the duration and extent of bare soil. **Minnesota Power will incorporate the SWPPP timeline and requirements**.
    - *Objective 1b.* Minnesota Power will utilize a native-dominant seed mix (Attachment 1) which is appropriate for this region and expected conditions with high diversity of grasses and forbs. Substitutions to this seed mix will follow the procedures outlined in Section 6.4.3. The seed mix will adhere to the following:
        - A minimum seeding rate of 40 seeds/sq ft^2
        - 9 grass/sedge species
        - 25 percent forb and legume seed by number of pure live seeds per square foot
        - Each guild is fulfilled: cool season grasses, warm season grasses, sedges/rushes, legume and non-legume forbs
        - 23 native species
        - Forb species that bloom in each portion of the growing season: early (April-May), mid (June-August), and late (August-October).
- Goal 2: Establish vegetation compatible with the Project operations and minimize maintenance requirements and costs.

- *Objective 2a.* Minnesota Power will utilize the diverse native seed mix included in Attachment 1. Substitutions to this seed mix will follow the procedures outlined in Section 6.4.3. The seed mix utilizes species which do not typically grow taller than 3 feet and are therefore anticipated to not impede or shade solar panels or obstruct maintenance and access.

- *Objective 2b*. Minnesota Power will utilize the seed mix included in Attachment 1 which includes a mix of diverse, native and perennial species and is intended to provide at least 70 percent cover by native species within 5 years. Tall or otherwise undesirable species will be identified during monitoring (Section 8) and will be managed appropriately (Section 6). Substitutions to this seed mix will follow the procedures outlined in Section 6.4.3.

- *Objective 2c*. Minnesota Power will employ the site preparation and seed installation techniques detailed in Section 6 and the management techniques detailed in Section 7 to quickly establish and maintain native vegetation within the first 5 years of vegetation management. Management methods will be implemented to reduce and remove populations of non-desirable species such as noxious, invasive, and woody species which would hinder the establishment of native vegetation and the effectiveness of the solar panels. Effective management will result in the achievement of the performance standards listed in Section 8.1.

- Goal 3: Provide soil stability and improve soil health over the duration of the Project while also benefiting native pollinators.

  - *Objective 3a.* Minnesota Power will utilize the seed mix included in Attachment 1 which includes 17 herbaceous species that flower during the growing season and act as a nectar source throughout the growing season to support native pollinators. A variety of species are included such that at least four species will be flowering during each season (Spring, Summer, Fall). Substitutions to this seed mix will follow the procedures outlined in Section 6.4.3.

  - *Objective 3b.* Minnesota Power will follow the site inspection requirements included under the Project SWPPP to identify any erosion or site stabilization concerns. Per the SWPPP, any site repairs or maintenance will occur **within X calendar days. Minnesota Power will incorporate the SWPPP timeline and requirements**.

Long-term objectives for the Pollinator Solar Array VMU (after 5+ years of management):

- Goal 4: Minimize invasive species, noxious weeds, and other undesirable species in the Site.

  - *Objective 4a.* To plan for long-term monitoring and maintenance to quickly detect new infestations and effectively control undesirable species, Minnesota Power will implement vegetation management (Section 7.1) and monitoring (Section 8) following their respective schedules such that the Performance standards are maintained (Section 8.1) within the Pollinator Solar Array VMU.

  - *Objective 4b*. Minnesota Power will install the seed mix included in Attachment 1 and following the adaptive management principles, will manage the VMU to maintain Performance Standards (Section 8.1) which promote the establishment of desirable plant species.

4.2 Existing Vegetation VMUs

The objectives below apply to the existing vegetation (wetland and upland) VMU areas outside the Pollinator Solar Array VMU (but within the Site) which will maintain the existing vegetation conditions.

Short-term objectives for the existing vegetation VMUs (Wetland and Surrounding Upland VMUs):

- Goal 1: Establishment of perennial vegetation over 70 percent of the plantable areas within the Site (this area would not include roads and infrastructure; Minnesota Power will determine the final plantable area at 90% design).
    - *Objective 1a*. Minnesota Power will employ the site preparation techniques (Section 6.1) and seed installation measures (Section 6) within **X days of X activity** per their SWPPP requirements to minimize the duration and extent of bare soil. Minnesota Power will incorporate the SWPPP timeline and requirements.
- Goal 2: Establish vegetation compatible with the Project operations and minimize maintenance requirements and costs.
    - *Objective 2a*. Minnesota Power will employ the site preparation and seed installation techniques detailed in Section 6 to quickly establish and maintain vegetation within the first 5 years of vegetation management.
- Goal 3: Provide soil stability and improve soil health over the duration of the Project.
    - *Objective 3b.* Minnesota Power will follow the site inspection requirements included under the Project SWPPP to identify any erosion or site stabilization concerns. Per the SWPPP, any site repairs or maintenance will occur within **X calendar days**. Minnesota Power will incorporate the SWPPP timeline and requirements.

Long-term objectives for the Wetland and Surrounding Upland VMUs:

- Goal 4: Minimize invasive species, noxious weeds, and other undesirable species in the Site.
    - *Objective 4a.* To plan for long-term monitoring and maintenance to quickly detect new infestations and effectively control undesirable species, Minnesota Power will implement vegetation management (Section 7.1) and monitoring (Section 8) following their respective schedules. Performance standards are not established for these VMU's as described further in Section 8.1.

4.3 Impervious Surface VMU

The objectives below apply to the Impervious surface VMU areas within the Site which will maintain the absence of vegetation.

Short-term objectives for the impervious Surface VMUs:

- Goal 1: Provide soil stability over the duration of the Project.
    - *Objective 1b.* Minnesota Power will follow the site inspection requirements included under the Project SWPPP to identify any erosion or site stabilization concerns. Per the SWPPP,

any site repairs or maintenance will occur within **X calendar days**. Minnesota Power will incorporate the SWPPP timeline and requirements.

Long-term objectives for the Impervious Surface VMUs:

- Goal 2: Minimize invasive species, noxious weeds, and other undesirable species in the Site.
  - *Objective 4a.* Minnesota Power will manage these areas to contain minimal to no vegetation establishment for the purposes of safe access and traffic. Performance standards are not established for these VMU's as described further in Section 8.1.

5 Contractor Qualifications

Minnesota Power will require the following qualifications for its third-party independent contractors:

1. Seeding contractors will have at minimum 5 years of experience installing native seed including installation within solar array projects in Minnesota and/or the upper Midwest.
2. Vegetation management contractors will have at minimum 5 years of experience maintaining native habitats.
3. Vegetation monitors may be the same as the vegetation management contractor but will have sufficient botanical experience identifying native plants, native plant communities, invasive species, and non-native species typical of Minnesota. The monitoring will occur independent of the management to provide an unbiased reporting of vegetation establishment.

Minnesota Power will select seeding and management contractor(s) prior to Project construction. Selected contractors will provide to Minnesota Power at least two references demonstrating the ability to successfully perform the anticipated scope of work described herein for the Project. Minnesota Power will oversee the contractor(s) during operation of the Project.

Minnesota Power will select only Minnesota Department of Agriculture (MDA) licensed commercial herbicide applicators for the Project that will follow manufacturer's directions, and application records maintained per state requirements.

6 Vegetation Establishment

The following vegetation establishment guidelines are recommendations for the Site to better attain the objectives and goals listed above. The first three years after construction is complete is a critical time for vegetation establishment and so is the focus of these recommendations. Minnesota Power may also use these practices until the vegetation meets the performance standards discussed in Section 8.1. Vegetation establishment will reference BWSR guidelines for seedbed preparation and site management.

6.1 Site Preparation

The contractor will install erosion and sediment controls before and during Project construction and in accordance with the Project SWPPP. To the extent feasible, Minnesota Power will limit grading work for the Project and minimize areas of disturbance to reduce impacts to the existing topsoil.

6.1.1 Existing Vegetation Management

Prior to and during construction, Minnesota Power may use a combination of herbicide applications and mowing in combination to control noxious weeds and woody species and prevent the production of undesirable seeds at the Project site. Where possible, Minnesota Power may coordinate with landowners to implement pre-construction management of noxious and other non-desirable species in the growing season prior to the planned construction start date. Tree clearing, grubbing and stump removal will occur only where necessary. The plan for existing vegetation management will be reviewed during the 90% design phase but may not be finalized until the official Request for Bid is posted.

Minnesota Power may implement reparatory herbicide treatments on existing non-desirable vegetation within the Site, if necessary, and where accessible. Mowing of the site or selected areas of the site will reduce the height of the vegetation and/or prepare it for more effective herbicide applications; mowing across the entire site may not be feasible or necessary depending on the pre-existing vegetation. Section 7.1 provides additional details regarding the determination of the locations requiring pre-construction management.

Additionally, herbicide application may be appropriate before scheduled seed installation to reduce competition of surrounding vegetation. Herbicide applications for this purpose will consist of an application of a non-specific herbicide and may include additional herbicides for species that may be present. A second herbicide treatment may be appropriate if areas of non-desirable vegetation are still growing after the first application. The contractor will minimize drift by using appropriate equipment calibrated to the weather conditions at the time of treatment. Minnesota Power and its contractor will schedule the herbicide applications to occur prior to the seeding installation dates based on the minimum residual time of the herbicide and the label instructions. The contractor will remove dead plant material, as necessary, to expose the topsoil for effective seeding activities and vegetation establishment.

6.1.2 Soil Management

The contractor will segregate the uppermost 12 inches of topsoil during grading and, upon construction completion, redistribute it across graded areas. If topsoil is observed to be less than 12 inches, the contractor will segregate the full topsoil present at that location. Where necessary, the contractor will aerate topsoil impacted by construction activities with chisel plows, rippers, or tillers depending on the depth and severity of the compaction. The contractor may disk topsoil to prepare a smooth, evenly textured soil surface.

6.1.3 Seedbed Preparation

Prior to installation of the seed mixes, the contractor will perform seedbed preparation activities, including decompaction and vegetation removal, to promote successful propagation and establishment of desired plants. Where necessary, the contractor will disk the decompaction or vegetation removal areas to prepare a smooth and evenly textured soil surface. Minnesota Power may instruct the contractor to use a no-till drill to seed in selected areas where pre-construction herbicide application(s) occurred.

6.1.4 Fertilizer Application

Minnesota Power does not propose fertilizer application to accompany the installation of a native seed mix. Should soil testing indicate the requirement for a fertilizer application, it will comply with the Minnesota DOT Specification 3881 for commercial fertilizer. The contractor will provide the soil test report and proposed fertilizer to Minnesota Power prior to application for approval.

6.1.5 Mulch Applications

Mulch applications in the Site will promote soil-to-seed contact and retention of soil moisture during vegetation establishment. Selected mulch products will comply with Minnesota DOT Standard Specifications for Construction, Section 3882 and will be certified weed-free.

The contractor will apply mulch within 24 hours of permanent seed application, except where covered by permanent structures or other stabilization measures. The contractor will use a mechanical spreader or other approved method to apply and anchor the mulch at a rate specified in the Minnesota DOT Standard Specifications for Construction, Section 2575.

Following the mulch application, the contractor will water the seeded areas at a minimum rate of 120 gallons of water per 1,000 square foot in a manner to prevent erosion or damage to the seeded surface.

6.2 Equipment Cleaning

To prevent the introduction of noxious weeds or additional/new non-desirable species to the Project area, Minnesota Power will require the contractor(s) clean equipment prior to arriving on-site. Should equipment arrive on-site contaminated with material or seeds from non-desirable species, the contractor will be responsible for cleaning the equipment and/or materials. The contractor will be responsible for proper disposal of material removed during the cleaning process.

6.3 Seed Installation

Seeding will occur prior to construction to quickly establish vegetation, where possible. This will further enhance soil stability during construction activities, prevent soil erosion, and reduce dust and sediment loss in the Site. Construction will inevitably result in some disturbance to these seeded areas, which may require re-seeding after completion of the work in that area.

Seeding will occur using either a hydroseeding implement (with tackifier) or a Truax no-till drill or Trillion type seeder (or similar) specific to native seed mixes. Where drill-seeding or hydro-seeding is not practical due to site conditions including the presence of solar panels and posts, the contractor will broadcast seed onto the soil surface using a Vicon seeder (or similar) and raked to provide seed-to-soil contact. Exact seeding methods, dates and equipment will be determined in coordination with the seeding contractor once the 90% design is available and the official construction start date has been selected.

Calibration of the seeding equipment will occur before the associated activities to confirm the proper seeding rate and depth. During operation the operator(s) will observe the equipment and seed application to confirm complete coverage and that the equipment does not cause rutting in the Site.

To prevent the establishment of non-desirable species in the Site, the Project will minimize the time duration between final grading activities and permanent seeding. Disturbed areas will receive a temporary cover crop and the contractor will supplement with the permanent mix in disturbed areas not otherwise stabilized.

6.4 Seed Mixes

Minnesota Power will require seed labeling that will follow the requirements of the Minnesota Seed Law, Section 21.82, including limits on noxious weed seed. In addition, the following will be on seed tags:

1. The origin of seed for all species in the mix to the smallest known geographic area (township, county, ecotype region, etc.).
2. Information pertaining to purity, germination and hard (dormant) seed of individual components in a mix.

6.4.1 Temporary Seed Mixture

Temporary seed mixture application to soils left undisturbed for more than 14 days during site construction will occur to reduce the risk of erosion. Temporary seed mixtures typically include cover crops consisting of annual grass species which germinate rapidly to provide vegetation presence and soil stability. These typically include species such as oats (spring or summer), annual rye (spring or summer), or wheat (fall). The contractor will select the temporary seed mixture based upon the timeframe of the application and with approval from Minnesota Power and apply using the broadcast method.

Additionally, permanent seed mixes may include components from the temporary seed mixture, at a reduced rate. This will provide soil stability during initial vegetation establishment.

6.4.2 Seed Mixes

Attachment 1 provides the seed mix for the Project which has the following characteristics:

- Composed of native species, which tolerate a variety of environmental conditions such as variable precipitation and temperature exposures.
- Contains a blend of forbs (17 species) and grasses/sedges (9 species) to maximize adaptability to potential growing conditions, including shade-tolerant species for under panel areas and bunch-forming grasses for habitat structure.
- Dominated by perennial species that greatly reduce the likelihood of re-seeding during the lifespan of the solar site.
- Contains a blend of species from multiple guilds and families including: cool season grasses; warm-season grasses; sedges/rushes/legume; and non-legume forbs.
- Adaptable to soil conditions present within the Site including species that can tolerate dry, mesic, and wet-mesic conditions.

- Designed with an average height range of 12 to 30 inches to avoid interfering with solar equipment.
- Use a temporary cover crop as appropriate to stabilize soils quickly.

Land use surrounding the Site includes cropland and pasture and therefore maintaining a specific chemical-free buffer zone is not feasible. The size and layout of the Site are such that pesticide drift from adjacent properties should be minimal, given standard best practices for application methods. Regardless, Minnesota Power Solar will communicate with landowners adjacent to the Site to inform them of the intended Project status as pollinator-friendly habitat, and thus the importance of controlling pesticide drift from adjacent agricultural properties onto the Site.

6.4.3 Seed Substitutions

Availability of species in the planned seed mix is subject to change based on Project approval, construction timelines, and variability in seed supply at the time of order placement. Minnesota Power must approve any substitutions which must remain consistent with the stated goals and objectives in this VMP. Substitution suitability considerations will include bloom season, species phenology, vegetation community structure, sun exposure and soil preferences, height, cost, and native status.

7 Vegetation Management

The following are general best-practice standards for pollinator-solar vegetation management. Minnesota Power anticipates actual maintenance will vary from these guidelines and will adapt to specific site conditions including the ongoing establishment by both seeded (desirable) and undesirable species across the Site. The timeline for vegetation management (Table 3) begins at the time of seeding, though it is anticipated this may vary in different areas or phases of the Project and based on construction schedules.

Minnesota Power does not intend to manage the Wetland VMU unless the existence of non-desirable species prove to be a seed source within the managed areas. Minnesota Power will manage noxious weeds in compliance with Minnesota Statute 18.78.

Table 3 Anticipated Vegetation Establishment and Management Timeline

Anticipated schedule	Vegetation Establishment/Management Task
Pre-Project	1. Noxious and non-desirable vegetation may be managed prior to construction and seeding where feasible.
Year 0 Establishment	1. Prior to construction, pre-seed with temporary seed mixed with permanent seed. 2. Seeding and re-seeding (as necessary). Use no-till drill seeding equipment where feasible, broadcast seeding will be implemented where drill seeding is infeasible. Seeding efforts will occur outside of winter and severe weather months (June through September) unless conditions are favorable (i.e. current soil moisture and forecasted precipitation levels).
Years 0 -1 Establishment	1. During construction, re-seed as appropriate and necessary and appropriate.
	2. Mow or sheep graze vegetation 2-3 times during growing season.
Years 2-5 Establishment & Management	1. Mow or sheep graze 1-2 times during the growing season. 2. Selective spot herbicide treatments 1-2 times per growing season.
Years 5+ Management	1. Selective spot herbicide treatments 1-2 times per growing season, as necessary. 2. Spot mowing or grazing during growing season and considering species phenology to prevent seed development, where necessary. 3. Clearing thatch by mowing (dormant season) or haying/grazing (growing season).

7.1 Vegetation Management Timeline

Year 1 Maintenance – During the first year growing season, the management contractor will mow or graze vegetation in the seeded areas 2-3 times to prevent seed production by non-desirable species, remove shading of small woody seedlings, and prevent shading of solar modules. Herbicide uses will only be a spot-treatment on aggressive perennial and/or woody non-desirable species; mowing will be the primary method of controlling non-desirable species during the first-year post-seeding.

Year 2 Maintenance – During the second year, vegetation in the seeded areas will likely require mowing or grazing 1-2 times during the growing season to control annual non-desirable species, promote good establishment of seeded species, and prevent shading of modules. Noxious, invasive, and woody vegetation may require mowing to prevent seed development. Selective spot-herbicide treatment will begin during the second growing season for biennial and perennial noxious weeds and woody species. Herbicide treatment will occur 1-2 times during the summer/early fall but scheduled strategically around mowing to promote proper herbicide uptake on the targeted individuals.

Year 3 Maintenance – During the third year, established vegetation in the seeded areas may require mowing or grazing 1-2 times during the growing season for control of tall-growing species, woody species, or perennial/noxious non-desirable species at risk of producing seed prior to herbicide application. Height-reduction mowing of the array area or portions thereof may be necessary in mid-summer to prevent shading of modules. Selective spot (or targeted) herbicide treatment will occur 1-2 times during the growing season for biennial/perennial invasive species, noxious weeds, and woody species, scheduled around the mowing schedule.

Year 4+ (Long-Term) Maintenance – During the long-term maintenance phase (year 4 onward assuming successful vegetation establishment by the end of year 3) the vegetation management strategy will shift to focus on maintenance rather than establishment. As stated in Section 5.1 the long-term objective for the established pollinator-solar site is minimizing the presence of noxious weeds and woody species and preventing shading of panels and vegetative interference with solar equipment. Spot-mowing or hand-cutting to address specific problem areas of non-desirable or woody species will occur when feasible, rather than complete mowing of the array or entire Site. Targeted spot herbicide treatment(s) will continue 1-2 times per year, as necessary, to reduce and remove populations of non-desirable species.

Depending on conditions and vegetation management needs, clearing thatch within the Site may occur on a rotational basis (approximately every 1-3 years) by haying, mowing or grazing. Haying and/or grazing is preferable to mowing due to the more complete removal of vegetative matter from the site, but Minnesota Power will select the method based upon external factors including availability of services, site conditions and site access. Grazing and haying activities would be restricted to the growing season whereas mowing may occur outside of the growing season if required for thatch reduction.

7.2 Adaptive Vegetation Management

Minnesota Power will implement vegetation management techniques immediately after seed installation and based upon the timeline in Section 7.1 but may adjust according to recommendations from the vegetation management and monitoring contractor(s). Selected methods of vegetation management will provide the best control of non-desirable species. Minnesota Power will also implement vegetation management to prevent established vegetation from shading or interfering with solar modules and equipment. Wherever possible, the contractor will avoid and prevent impacts to the desirable species during management activities.

Vegetation management timelines and methodologies will generally follow the schedule in Table 4 but may be adjusted based upon observations during site monitoring efforts (Section 8) as well as an ongoing assessment of the achievement of the overall site objectives (Section 4) and site performance standards (Section 8.1). In particular, management approaches may be adjusted based upon the establishment of unexpected species at the site (desirable and non-desirable), the availability of resources for management and weather conditions. Changes in the vegetation management plan will be further detailed in the vegetation management report produced by the respective contractor (Section 8).

Adaptive management will be an ongoing collaborative process between Minnesota Power, vegetation management contractors and vegetation monitoring contractors to confirm proper vegetation establishment in the Site and prevent the establishment of non-desirable species to meet the objectives listed in Section 4.1. Minnesota Power may test management methods on small areas before implementation across the site to better understand if those approaches are preferable for the specific site conditions. Monitoring and consistent communication are critical for successful achievement of the objectives in this VMP and overall site success.

Table 4 describes the typical seasonality for vegetation management methods. These methods may be necessary as adaptive management during the long-term management phase of the Project (year 5+) based upon site assessments and discussions with the vegetation management contractor completed throughout the life of the Project.

Table 4 Adaptive Management Options

Timeframe	Adaptive Management Technique	Notes
Spring	Early season site assessment and site management planning; continued reporting from previous growing season	Incorporate recommendations from previous year, as needed and appropriate.
Early Summer	First round of maintenance; spot mowing or grazing is typical. Spot spray treatments may be appropriate depending on the targeted species.	Targeted cutting treatments where possible.
Early to Mid-Summer	Mid-summer site assessment	Complete the assessment within 3 weeks of first maintenance service. Ideally, the assessment would occur 1-2 weeks following mowing/grazing and 2-3 weeks following herbicide treatment.
Mid-Summer	Second round of maintenance: herbicide treatment is typical. Spot mowing may be appropriate to prevent seed development.	Targeted chemical treatments where possible.
Mid to Late Summer	Late summer site assessment	Complete the assessment within 3 weeks of second maintenance service. Ideally, the assessment would occur 1-2 weeks following mowing/grazing and 2-3 weeks following herbicide treatment.
Late Summer to Fall	Third round of maintenance: mowing, spot cutting, herbicide treatment as needed based upon targeted species	Mowing or spot cutting may be employed to remove shading/interference
Fall	End of season site assessment and reporting	Review effectiveness of the techniques employed over the last year and recommend adjustments where appropriate.

7.3 Vegetation Management Methods

Minnesota Power will control noxious, invasive, and other non-desirable plant species for the life of the Project as required for safe operation of solar equipment and per Minnesota Statute 18.78. Minnesota Power will manage the species listed on the Minnesota State Noxious Weed List (reference (13)) per their designated category on the list at the time of the inspection (i.e., eradicate or control).

Minnesota Power will also control invasive plant species (references (12); (14)) to prevent or remove interference with solar equipment, achieve performance standards (Section 8.1) and maintain the health and quality of pollinator habitat. Complete control of certain invasive species may not be achievable for select species, such as reed canary grass and smooth brome, as those species are often extremely difficult to eradicate without extensive effort and collateral damage to desirable species. These species are already abundant in the area, are not considered noxious weeds, and should not negatively impact

neighboring properties. However, control of reed canary grass within the Solar Array VMU is likely to be necessary due to its typical height and potential for interference with solar panels.

Other undesirable species on solar projects are those which interfere with electrical equipment, shade panels, or damage fences or other infrastructure, particularly trees, shrubs, vines, and excessively tall and aggressive herbaceous species.

7.3.1 Herbicide Treatment

Herbicide treatments may include selective or non-selective herbicides, spot or broadcast applications, and pre-emergent applications. Minnesota Power will select treatments to control perennial noxious weeds and woody species which mowing or grazing does not effectively control alone. Herbicide treatment will reduce the populations of undesirable species, prevent the spread of weed seeds, and kill vegetation that may be encroaching on or shading solar modules and equipment.

Applications will use herbicides appropriate for the targeted control of the undesirable species; the exact herbicide to be used will be selected in coordination with the vegetation management contractor and will follow the manufacturer's label at the recommended rate of application. Surfactants will be utilized based upon the recommendation of the vegetation management contractor and when appropriate based upon site conditions and the targeted method of application. Treatment frequency will be assessed after the spring site assessment and in coordination with the vegetation management contractor to provide effective treatment and minimal non-target impacts.

For general control of non-desirable species, selective herbicides (formulated for specific plant groups) and spot application (applying directly to the foliage of target plants) are preferable to broadcast and non-selective applications. Use of spot spray methods and selective herbicides will promote effective control of undesirable species while minimizing off-target damage to desirable species.

Broadcast applications may be appropriate if a single non-desirable species or vegetation type, such as Canada thistle or reed canary grass, dominates large areas of the Site. Should broadcast application be appropriate, Minnesota Power and/or its contractor will use the most selective herbicide, limit the application to the minimum effective area, and complete during the proper timing to minimize non-target damage. If non-selective herbicides are necessary for certain non-desirable species, such as hybrid or invasive cattails, Minnesota Power will limit use of the herbicide to the minimum effective area and method of application.

In addition to herbicide treatment for non-desirable species, pre-emergent and non-selective herbicides application may occur on specific areas of the Site (around electrical equipment and along roads/gravel) to actively maintain bare ground such as within the Impervious Surface VMU. Herbicide treatments to maintain bare ground will include a chemical adjuvant to increase soil deposition/adsorption and prevent runoff.

7.3.2 Mowing

Mowing reduces vegetation height, prevents, or removes shading from solar modules, controls weeds and woody species, clears away dormant vegetation, and improves the aesthetics of a site. The reduction in fuel height at the site, specifically around the solar arrays, also reduces wildfire risk though thatch would require periodic removal from the site. Should mowing be the preferred approach to site vegetation management based upon the ongoing monitoring (Section 8) and the site management objectives

(Section 4), thatch removal will be implemented at least once every three (3) years through haying (Section 7.3.3).

Mowing may occur in the following areas: solar array area, open area(s) within fence, entrances around gates, and area(s) outside fence. Mowing implements include agricultural tractors with flail or rotary mower attachments, zero-turn mowers, robotic mowers, and/or other mechanical options (with Minnesota Power approval). Flail mower implements mulch the cut material and avoid forming a mat of cut vegetation which could smother desirable plant growth. Where appropriate, mower height should be at least 8-10" from the ground to minimize damage to native plants.

Wet areas are challenging for mowers because water restricts access and increases the risk of equipment damaging the soil and/or seeded plants through rutting. Therefore, mowing in wet areas will occur when conditions are dry, or avoid altogether and replace with hand cutting/weed whipping if necessary. For use in the Site, the blades will be at a raised height of 4-6 inches to prevent scouring of the ground surface and avoid excessive damage to the native perennial species. When possible, mowing prior to May will not occur as it may impact pollinators that overwinter in plant stems or at the base of vegetation.

Haying or grazing may be implemented in combination with mowing to remove thatch build up at the site to prevent smothering new growth and reduce wildfire risk and intensity.

7.3.3 Haying

Haying can reduce thatch buildup by the physical removal of vegetation from a site, particularly in the absence of fire. Most native species seeded on pollinator-solar sites evolved with a dependence on fire for clearing of dormant vegetation and cannot thrive long-term without a similar level of disturbance impact. Additionally, this reduces wildfire risk within the solar array due to lower fuel loads present in the dormant season.

Haying typically occurs over several activities: mowing, drying of the cut vegetation, windrowing the material, mechanical baling, and removal of the baled thatch material. Most commonly, haying requires the use of equipment such as agricultural tractors and raking and baling implements which require scaling to fit within the solar site. For use in the Site, the blades will be at a raised height of 4-6 inches to prevent scouring of the ground surface and avoid excessive damage to the native perennial species. Haying may occur on an as-needed-basis throughout the growing season, though most often in late summer and fall. Hayed vegetation would be removed from the site to prevent smothering new growth.

7.3.4 Spot Mowing

Spot mowing using weed whips or manual trimming equipment can remove excessive vegetation growth in areas with difficult access requirements that may prevent the use of large mechanical mowing equipment. These areas may include:

- directly underneath and around solar panels,
- around and under sensitive equipment and infrastructure (i.e. electrical),
- around gates and fence lines
- in wet or steep areas,

- in areas with erosion controls in place (or other BMPs), and
- around screening trees and shrubs.

Weed whipping or manual trimming may also be an effective tool to spot-mow small areas of non-desirable species where spot-spray herbicide treatments are not appropriate. Spot mowing will employ the same protection measures prescribed for mowing activities (Section 7.3.2) to minimize damage to native plants.

7.3.5 Grazing

Grazing is a vegetation management option that may be implemented in addition to or in place of the haying/mowing procedures described above. This approach would manage plant height, reduce thatch accumulation and provide weed control. Because sheep can easily access areas of the site where equipment access is difficult such as around infrastructure/equipment, under panels and along fencelines/infrastructure. This method would also effectively reduce thatch build-up thereby reducing the risk and intensity of wildfires.

Effective implementation of grazing as a vegetation management approach would require high animal stocking density (greater than 20 animal units per acre) to achieve uniform height and vegetation reduction (approximately 60-70% removal) throughout the management unit. This stocking density would be in place for a short duration (approximately 1-2 weeks but no more than 4 weeks in one unit) and is intended to mimic the impacts from a natural wildfire. However, this high intensity grazing would not be implemented at the site within the same unit more than once during each growing season.

Low-intensity grazing (reduce animal density or for shorter durations) may be implemented on an as-appropriate basis to reduce thatch accumulation or the management of non-desirable species where mowing/haying may not be achievable.

Should grazing be selected as a realistic vegetation management method, Minnesota Power will update this Vegetation Management Plan with a grazing plan as Attachment 4 which will include the goals of grazing, the type and number of animals to be used, plans for fencing, the time and duration of grazing, and the decision-making process for ensuring that vegetation is not over-grazed. This information is anticipated to be provided prior to the posting for the Request for Bid and after vegetation management contractor is selected. Minnesota Power will work with the vegetation management contractor on the development of the grazing plan.

7.3.6 Woody Species Control

Woody species, including trees, shrubs, and vines are a concern on solar array sites due to their potential interference with electrical equipment, shading of modules, and damage to fences or other infrastructure. Control of woody species can occur through a combination of vegetation management techniques (mowing, manual cutting, and herbicide treatments). Minnesota Power will use adaptive management to select the most effective method of management with the least anticipated non-target impacts.

Mowing can temporarily cut back woody species in accessible areas to prevent shading conditions on modules. However, cutting alone will not kill deciduous tree species with most re-sprouting after. Management methods for woody species will include:

- Foliar herbicide treatment can kill vines and small tree/shrub seedlings less than approximately 4’ tall and ½" diameter, provided leaf surfaces have a coat of an appropriate herbicide applied at the correct rate.

- For tree and shrub seedlings larger than this size, the least-impactful and most-effective method of control is manual cutting with brush saws or chainsaws and then treating stumps with herbicide to kill the root system and prevent re-sprouting.

Minnesota Power will consider site conditions, infrastructure, and safety needs when selecting the method of control for woody species. Woody species control may be implemented throughout the growing or non-growing season depending on the targeted species and method of application. Foliar treatment would occur during the growing season however stump treatments may occur outside of the growing season. Exact timing and method of treatment will be determined during the monitoring assessment and in collaboration with the vegetation management contractor.

7.3.7 Supplemental Seeding

Supplemental seeding may be necessary where vegetation establishment does not achieve the expectations of this VMP, permit or regulatory requirements. Vegetation establishment failure can occur from a variety of causes, including compacted soil conditions, flooding, drought, and extensive competition from non-desirable species. Minnesota Power will reseed areas over 100 square feet with sparse establishment (less than one native plant every 1.5 feet on average) after the first full growing season using the original seed mix specified for the Project. Depending on the reason(s) for failure, Minnesota Power may adjust species in the re-seeding mix to better accommodate growing conditions present in the area of concern.

If temporary disturbance is necessary after final construction (such as excavating or trenching for repairs or maintenance), Minnesota Power will choose an appropriate seed mix for these areas based upon the conditions present. If maintenance activities (such as travel paths) impact certain areas and initially seeded species fail to establish, reseeding may occur with species that can tolerate a higher level of disturbance.

Seed selection and rate for any supplemental seeding will consider site conditions present at the time of re-seeding. Further, Minnesota Power will incorporate cover crops, if appropriate, according to the rate listed in the initial seed mix (Attachment 1). The timing and method of supplemental seeding will be situationally dependent and considering the conditions and scope.

8 Site Monitoring

During construction and following SWPPP and AIMP requirements, Minnesota Power will conduct site monitoring to maintain soil health. This will focus on reducing impacts related to construction including soil compaction, soil erosion, stormwater run-off, and soil separation and storage. These reporting requirements will fall under the SWPPP but will inform final restoration activities and stabilization efforts. Should additional restoration requirements be identified during this in-progress monitoring, Minnesota Power will update or amend this VMP as appropriate.

Minnesota Power will contract a qualified restoration ecologist to conduct vegetation monitoring and confirm the Project is on track to achieve the goals and objectives listed in this VMP. Monitoring will assess the following to determine the achievement of the management objectives (Section 4) and performance standards (Section 8.1):

- evaluate the establishment of seeded species
- identify invasive, noxious, and woody species presence; this includes species on-site and early detection of new invasions.
- check for erosion or other Site issues
- determine vegetation maintenance needs and timing
- an assessment of the goals and achievement of objectives by each management unit. Where appropriate, a timeline for these projected outcomes will be included.

During years 1-3, monitoring visits will occur at regular intervals throughout the growing season, approximately May, July, and September/October to evaluate and provide recommendations for adjustments to the planned upcoming vegetation management strategies. After the early establishment period (years 1-3), monitoring visits will occur mid-summer (June/July) in coordination with vegetation management activities to provide an accurate assessment of the Site vegetation and timely recommendations for further management services.

Qualitative monitoring will occur during each monitoring visit beginning in Year 1. This will consist of a general review of the Site to document problem areas with noxious and invasive species, tree seedlings and erosion issues. This assessment will provide information and direction to vegetation management contractors to address each issue. Qualitative monitoring will continue for the duration of the Project to guide vegetation management decisions.

Quantitative monitoring will begin in Year 3 to evaluate vegetation establishment. Quantitative monitoring will continue every third year thereafter for the duration of the Project. Quantitative monitoring consists of timed-meander surveys within approximately 20 separate Assessment Areas (AAs) each no larger than 20 acres. The AAs will include at least 20 percent of the full Site and the Solar Array VMU. Within each AA, an ecologist will walk for 20 minutes and document all species encountered. **Minnesota Power will delineate these AAs when the 90% design is available (Figure 12).**

Placeholder for:

Figure 12 Monitoring Assessment Areas

8.1 Performance Standards

At the end of the third full growing season and continuing for every third year thereafter for the duration of the Project, Minnesota Power will assess vegetative cover to determine successful establishment. Successful vegetation establishment as determined will mean the achievement of the management objectives and goals listed in Section 4. This will be determined through the following performance criteria:

- The plantable area has at least 70 percent or more vegetative cover not including roads, etc.
- The Solar Array VMU meets the following:
    - Noxious weeds and invasive species will not exceed 10 percent cover
    - At least 70 percent cover by native species
    - At least 15 native species have 1 percent or greater cover
    - Forb species make up at least 15 percent cover
    - At least 3 species are present that bloom in early summer and 3 that bloom in late summer
- The Impervious Surface, Surrounding Upland and Wetland VMUs do not have associated performance criteria as Minnesota Power will not manage them unless necessary to reduce cover by non-desirable species and achieve the objectives listed in Section 5 and the performance standards in Section 8.1. Minnesota Power will determine management guidelines in consultation with the monitoring contractor and based on the Solar Array VMU performance standard achievements.
- Minnesota Power will not disturb or manage the Open Water VMUs under this VMP.

Areas that fail to meet these performance standards require treatment. This may include additional management (mowing, herbicide treatment), additional qualitative monitoring, along with re-seeding if necessary. Minnesota Power will continue extra monitoring visits and more intensive management of problem areas until they meet the vegetation establishment performance standards.

9 Reporting

The monitoring contractor will compile annual reports following the final monitoring visit each year and submit them to Minnesota Power. These reports will include a summary of findings for both qualitative and quantitative monitoring, along with a summary of coordination with the vegetation management contractor.

The vegetation management contractor will compile annual reports and submit them to Minnesota Power no later than January 31 following each monitoring year. These reports will consist of:

- a summary of current site conditions and any notable changes from the previous year
- a summary of management activities conducted during the year
- observed vegetation establishment success/progress towards performance standards
- a list of the noxious/invasive species present
- a map of the management units/locations identification of issues present
- a description of the corrective actions recommended and a schedule for implementation
- the management plan proposed for the following growing season, including the timing and method of management throughout the growing season. If herbicide treatment is necessary, the contractor will identify the herbicide type, surfactant, rate and frequency of application.

If the same contractor completes the vegetation management and monitoring, they may prepare a single report for submittal to Minnesota Power.

Minnesota Power will submit annual reports as required to the relevant local or state government agencies. These agency reports will include information listed above from the vegetation management report, along with the qualitative monitoring results from the monitoring report.

10 References

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Attachments

Attachment 1

Seed Mix

Attachment 1 Seed Mix

Minnesota Native Landscapes

8740 77th Street NE Otsego, MN 55362

MNL Solar
Native Pollinator Array Mix

Date:	1/1/2020
PLS lbs/acre:	10.00

	Scientific Name	Common Name	% of Mix	PLS lbs/ac	Bloom Season
Grasses:	Bouteloua curtipendula	Side-Oats Grama	22.00	2.20	
	Bromus kalmii	Prairie Brome	8.00	0.80	
	Elymus trachycaulus	Slender Wheat-Grass	8.00	0.80	
	Elymus villosus	Silky Wild Rye	5.00	0.50	
	Elymus virginicus	Virginia Wild Rye	8.00	0.80	
	Schizachyrium scoparium	Little Bluestem	17.00	1.70	
	Sporobolus cryptandrus	Sand Dropseed	2.00	0.20	
Sedges:	Carex bicknellii	Copper Shouldered Oval Sedge	2.00	0.20	
	Carex sprengelii	Long Beaked Sedge	8.00	0.80	
Forbs:	Achillea millefolium	Yarrow	0.25	0.03	Summer
	Agastache foeniculum	Fragrant Giant Hyssop	1.00	0.10	Summer
	Aquilegia canadensis	Columbine	0.25	0.03	Spring
	Anemone canadensis	Canada Anemone	0.25	0.03	Spring
	Asclepias syriaca	Common Milkweed	1.50	0.15	Summer
	Asclepias tuberosa	Butterfly Milkweed	0.75	0.08	Summer
	Chamaecrista fasciculata	Partridge Pea	3.00	0.30	Fall
	Dalea candida	White Prairie Clover	2.50	0.25	Summer
	Dalea purpureum	Purple Prairie Clover	3.50	0.35	Summer
	Monarda fistulosa	Wild Bergamot	0.75	0.08	Summer
	Penstemon grandiflorus	Showy Penstemon	0.25	0.03	Spring
	Pycnanthemum virginianum	Mountain Mint	0.50	0.05	Summer
	Rudbeckia hirta	Black Eyed Susan	3.00	0.30	Summer
	Solidago nemoralis	Gray Goldenrod	0.25	0.03	Fall
	Symphyotrichum lateriflorum	Calico Aster	0.50	0.05	Fall
	Symphyotrichum oolentangiensis	Sky Blue Aster	0.50	0.05	Fall
	Zizia aurea	Golden Alexanders	1.25	0.13	Spring

Species subject to change based on availability.

Wes@MNLcorp.com
8740 77th St NE Otsego, MN 55362
Office: (763) 295-0010
Fax: (763) 295-0025

Attachment 2

Project Designs

Attachment 3

Site Photographs

Attachment 4

Site Grazing Plan

Attachment 4 Site Grazing Plan