Appendix E
Vegetation Management Plan

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This draft Vegetation Management Plan (VMP) was prepared by MNL for Gopher State Solar, LLC (Gopher State Solar) in January 2024. Gopher State Solar further refined the Project Area following preparation of the draft VMP. Gopher State Solar will update the VMP to reflect the 1,645 acre Project Area presented in the Site Permit Application as it incorporates other agency and public comments received on the VMP during the site permit process.

Gopher State Solar

Vegetation Management Plan

January 2024

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Executive Summary

Gopher State Solar, LLC (Gopher State Solar) proposes to construct and operate a 200 megawatt (MW) photovoltaic (PV) solar energy generating facility and associated infrastructure, known as the Gopher State Solar Project (or Project). The proposed Project is located in Kingman, Osceola, and Bird Island townships in Renville County, Minnesota. The area within the Project boundary is approximately 1,667 acres in size, 979 acres of which will be occupied by the solar panels and associated infrastructure (the Site).

The proposed Project occurs on predominately agricultural cultivated cropland on gently rolling terrain with soils that are mostly loam, clay loam, and clay textures.

The overall goal of this Vegetation Management Plan (VMP) is to establish perennial vegetation throughout the Site area utilizing diverse native prairie species to the greatest extent practical. The vegetation will need to be compatible with the operation and maintenance of the solar generation facility. This perennial vegetation is expected to stabilize the soil, improve overall soil health, and provide habitat for native pollinators and other wildlife. Over the lifetime of the Project, Gopher State Solar will continue to maintain this diverse native vegetation to control invasive and other unwanted species.

1.0 Introduction

The Project is a 200-megawatt (MW) solar project on approximately 1,667-acres in Renville County (Figure 1) north of Bird Island, Minnesota. The Project is discontinuous with collector lines among them to connect the electricity to the substation within the Main block.

Goals and objectives

This VMP follows best practices for establishment of native vegetation based on guidance from the Minnesota Board of Water and Soil Resources (BWSR 2019; Minnesota Department of Commerce 2021). Gopher State Solar's primary goals related to vegetation management are described below with the related objectives to meet the goals.

Goal 1: Establishment of perennial vegetation throughout the Site.

- **Objective 1a.** Design seed mixes appropriate for this region and expected conditions.
- **Objective 1b.** Prepare an establishment plan that minimizes the duration and extent of bare soil to ensure soil stability.

Goal 2: Establish vegetation that will be compatible with the Project operations and minimize maintenance needs.

- **Objective 2a.** Design seed mixes that will not impede or shade solar panels and will allow travel within the facility for maintenance and access.
- **Objective 2b.** Use low maintenance vegetation that reduces the need for trimming and develops robust cover that minimizes potential invasive from undesirable species.

Goal 3: Plan for vegetation to provide soil stability, improve soil health, and benefits native wildlife including pollinators.

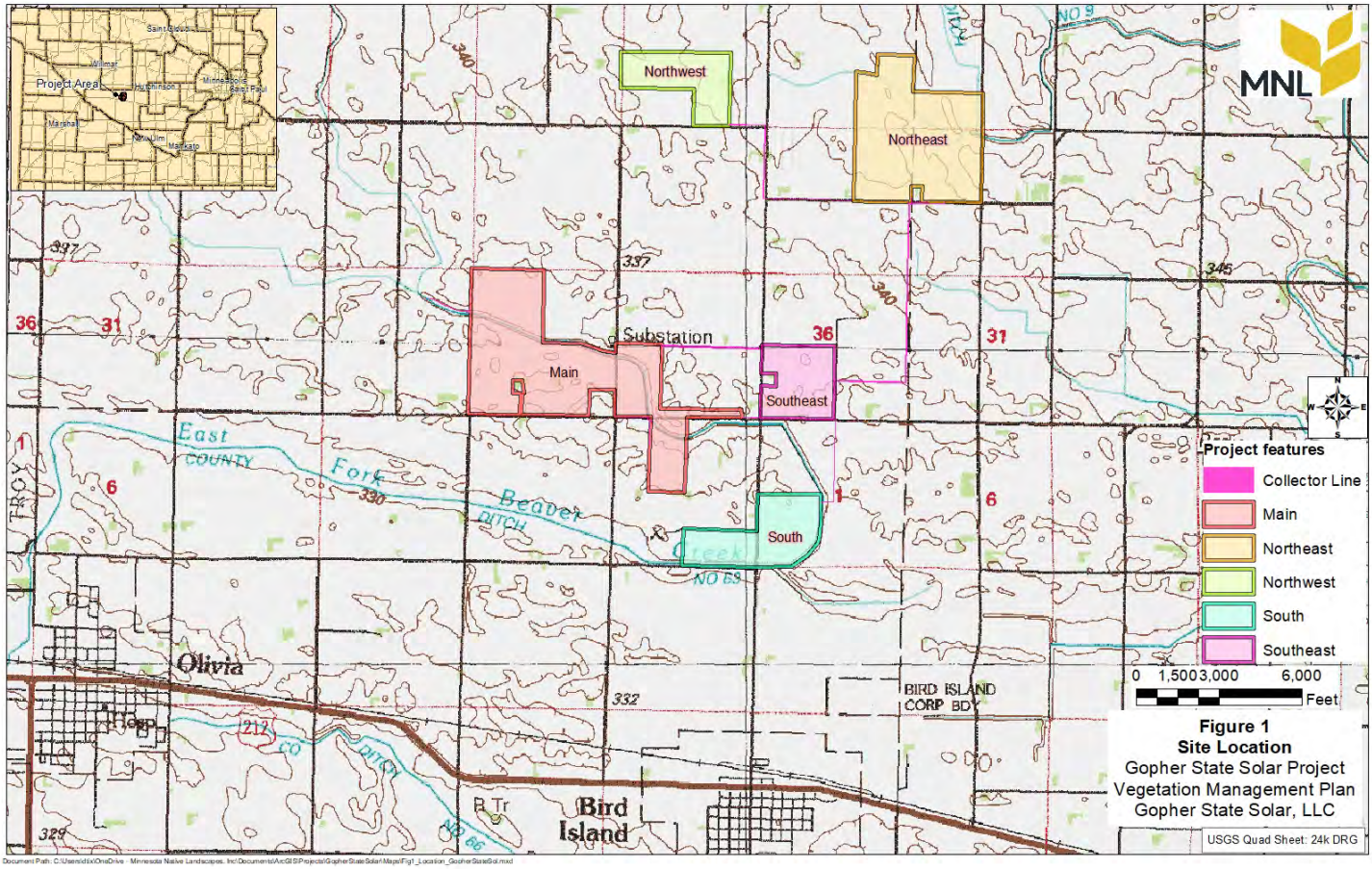
- **Objective 3a.** Provide nectar sources from plants throughout the Site including as much native vegetation as possible.

Objective 3b. Plan for management methods that minimizes widespread herbicide applications and treatments to reduce vegetation height and thatch accumulation.

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

Objective 4a. Plan for long-term monitoring and maintenance that will reduce new infestations a rapidly control species that become established.

Figure 1. Site Location



2.0 Site Location and Description

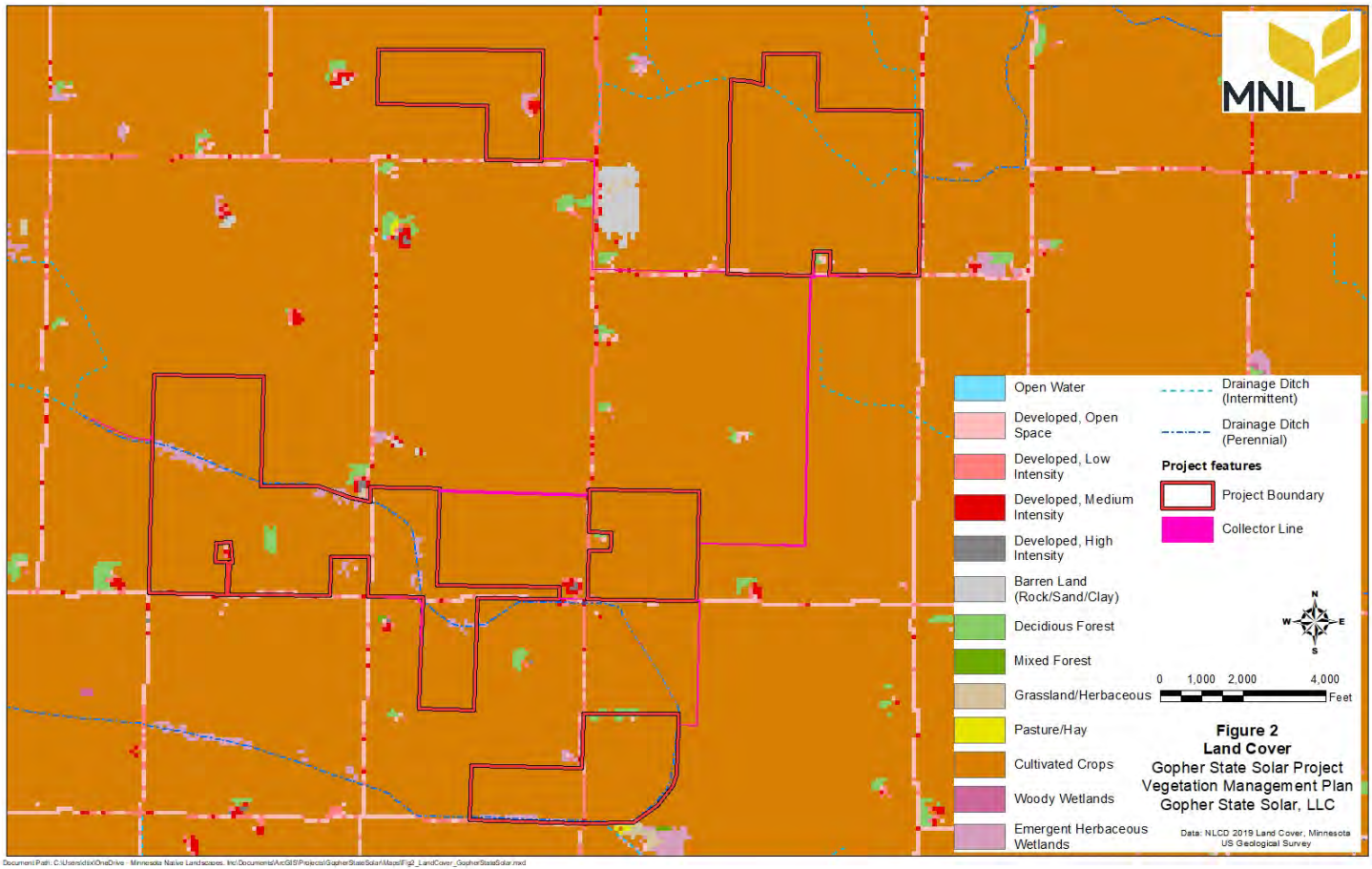
The proposed project is located in Kingman, Osceola, and Bird Island Townships, in Renville County (Figure 1). The Project is made up of five separate blocks of land, covering approximately 1,667 acres in total just north of Bird Island, Minnesota, northeast of Olivia, and north of Highway 212. The landscape of this area is on gently rolling terrain and predominately agricultural activities.

The Project is adjacent to Great River Energy's existing 230 kV Panther Substation, which will be the Project's Point of Interconnection (POI.) Connecting the Project to the POI will require an approximately 1,300-foot-long gen-tie line between the proposed new Project substation and the Panther Substation.

2.2 Existing Land Use and Land Cover

The Project will affect predominately agricultural cultivated cropland (Figure 2). Common crops in the area include sugar beets, corn, and soybeans. There are a few small shelterbelt tree plantings within the Site and some rural residences within and adjacent to the Site. There are several farmsteads in the area that include a house, outbuildings, and grain storage. There are an average of 4 to 6 rural residences within a square mile.

Figure 2. Land Cover



2.3 Soils

The county soil survey data from the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) is presented in Figure 4. The soils within the Site are primarily clay loam, silty clay loam, or loam textured. The Site occurs on approximately 423 acres of prime farmland, and 1,039 acres of prime farmland if drained. This acreage of prime farmland would be under perennial vegetation for the anticipated 40-year life of the Project. During the Project operation, soil organic matter, water holding capacity, and other soil health indicators are expected to improve and be better when it is returned to production in the future.

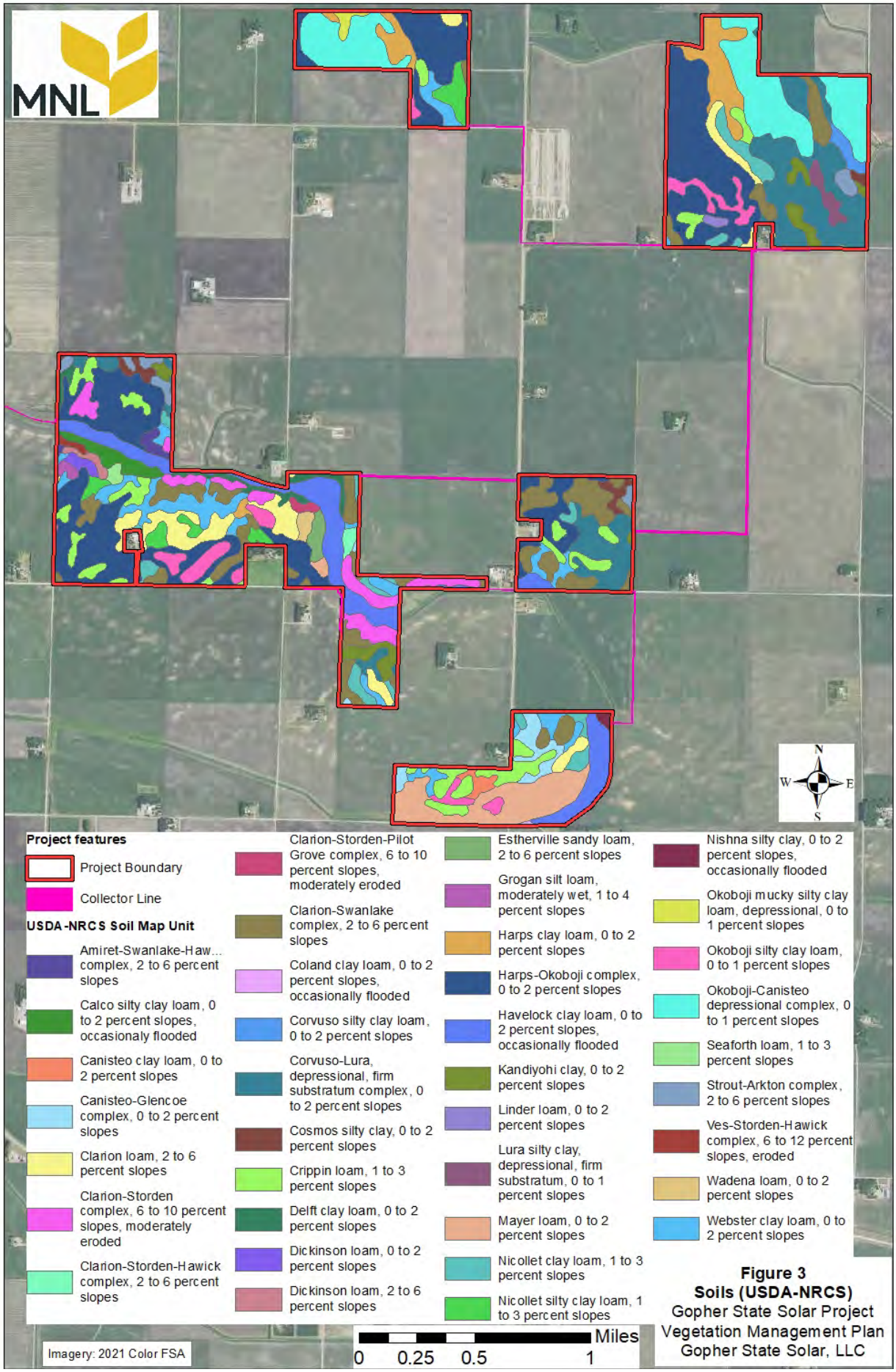


Figure 3
Soils (USDA-NRCS)
Gopher State Solar Project
Vegetation Management Plan
Gopher State Solar, LLC

Table 1. Summary of soils series for Gopher State Solar

Soil Series Map Unit Name (Soils covering more than 3% of Project Area)	Area (acres)	Percent of Project Area
Harps-Okoboji complex, 0 to 2 percent slopes	369.5	21.8%
Corvuso-Lura, depressional, firm substratum complex, 0 to 2 percent slopes	164.9	9.7%
Okoboji-Canisteo depressional complex, 0 to 1 percent slopes	152.5	9.0%
Clarion-Swanlake complex, 2 to 6 percent slopes	147.2	8.7%
Havelock clay loam, 0 to 2 percent slopes, occasionally flooded	109.4	6.5%
Crippin loam, 1 to 3 percent slopes	87.2	5.1%
Webster clay loam, 0 to 2 percent slopes	79.1	4.7%
Clarion loam, 2 to 6 percent slopes	75.2	4.4%
Mayer loam, 0 to 2 percent slopes	74.3	4.4%
Harps clay loam, 0 to 2 percent slopes	56.2	3.3%
Clarion-Storden complex, 6 to 10 percent slopes, moderately eroded	52.3	3.1%
Nicollet clay loam, 1 to 3 percent slopes	49.1	2.9%
Okoboji silty clay loam, 0 to 1 percent slopes	46.3	2.7%
Kandiyohi clay, 0 to 2 percent slopes	30.5	1.8%
Nicollet silty clay loam, 1 to 3 percent slopes	29.6	1.7%
Canisteo-Glencoe complex, 0 to 2 percent slopes	21.5	1.3%
Strout-Arkton complex, 2 to 6 percent slopes	19.8	1.2%
Delft clay loam, 0 to 2 percent slopes	18.6	1.1%
Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	15.7	0.9%
Cosmos silty clay, 0 to 2 percent slopes	14.0	0.8%
Lura silty clay, depressional, firm substratum, 0 to 1 percent slopes	10.0	0.6%
Corvuso silty clay loam, 0 to 2 percent slopes	8.1	0.5%
Estherville sandy loam, 2 to 6 percent slopes	7.8	0.5%
Canisteo clay loam, 0 to 2 percent slopes	6.6	0.4%
Amiret-Swanlake-Hawick complex, 2 to 6 percent slopes	6.2	0.4%
Other soil series (each <6 acres within Project Boundaries)	*43.0*	*2.5%*
Total	**1,694.9**	

2.4 Topography

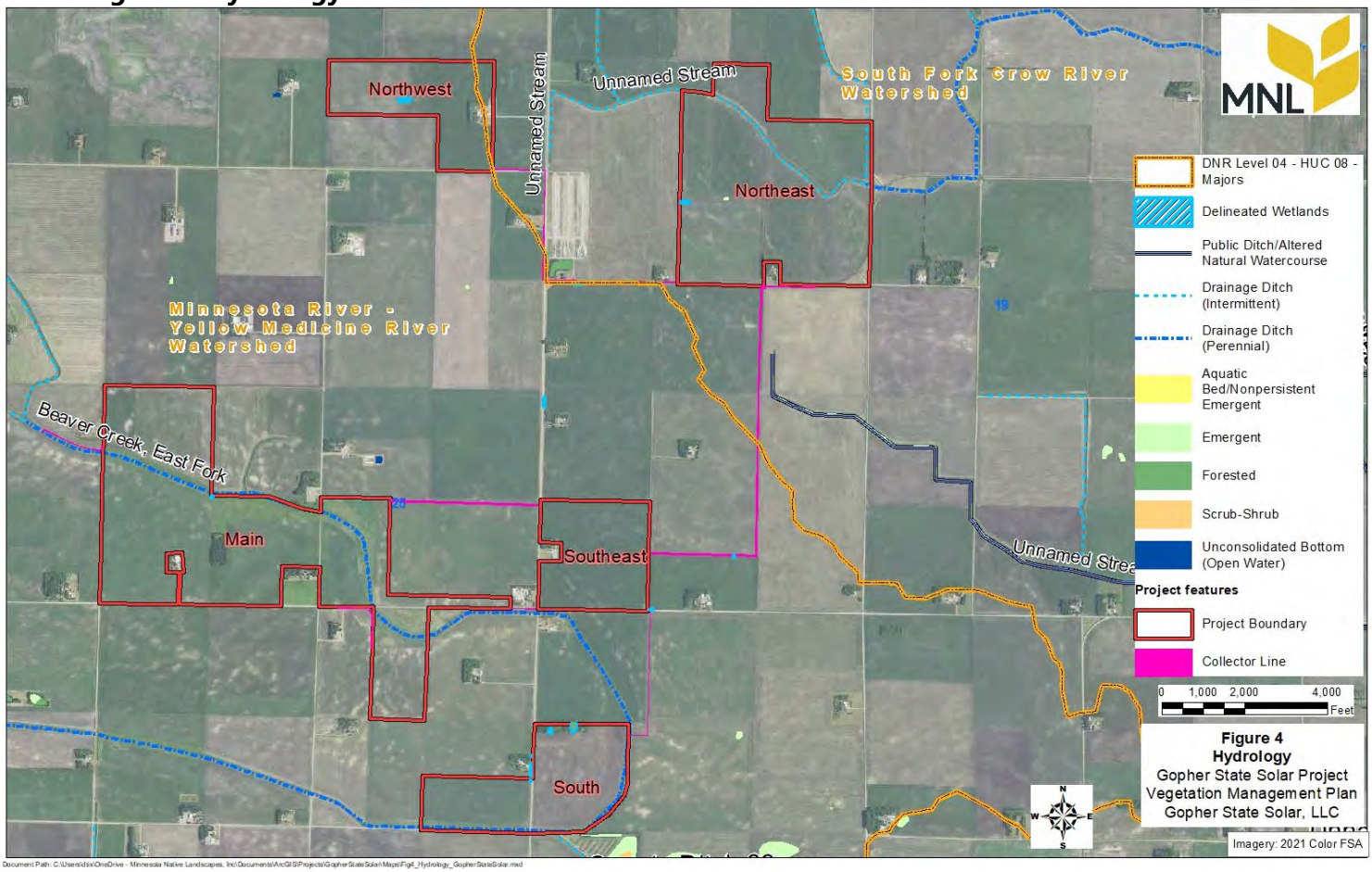
The Site is located in a relatively level area of glacial till on an end moraine complex. With small areas of wetland organic sediments. The elevations here range from about 1,073 feet above mean sea level (ft. MSL) in the southern portions to 1131 ft. MSL in the Northeast block. This is a relatively level area with only gradually rolling terrain (Figure 1).

2.5 Hydrology

The Site lies between two major watersheds (Figure 4). The Main, Southeast, South, and most of the Northwest blocks are within the Minnesota River – Yellow Medicine River Watershed. These areas drain into Beaver Creek flowing west of the Site. The Northeast and a small portion of the Northwest blocks drain into the South Fork of the Crow River toward the Mississippi River. These areas flow east via Judicial Ditch 9 and an unnamed stream toward the South Fork of the Crow River.

There are 14 small wetlands, all less than 0.6 acres mapped within the Site and in the surrounding areas (Figure 4). A wetland delineation was completed, the report has been submitted for review by the Local Government Unit (LGU).

Figure 4. Hydrology



National Wetland Inventory (NWI) wetlands are also mapped in the area and these are mostly very small or outside the boundaries of the Site. Several linear ditches have been mapped as part of the NWI and are shown adjacent to the Site.

3.0 Management Units

The Site is divided into five blocks that each contain solar arrays and associated infrastructure (Figure 4). Collector lines and roads (mostly public roads) connect each of these blocks.

- Main unit: this is the largest single unit and includes the proposed substation and other infrastructure including roads and buildings to support the Project. This unit has a segment of the Beaver Creek – East Fork flowing through it from west to east; it will be outside the fenced areas of the arrays.
- Southeast and South Units: these are located near the Main unit. The South unit has Beaver Creek flowing south and then west along the east and southern edge, outside the fenced area.

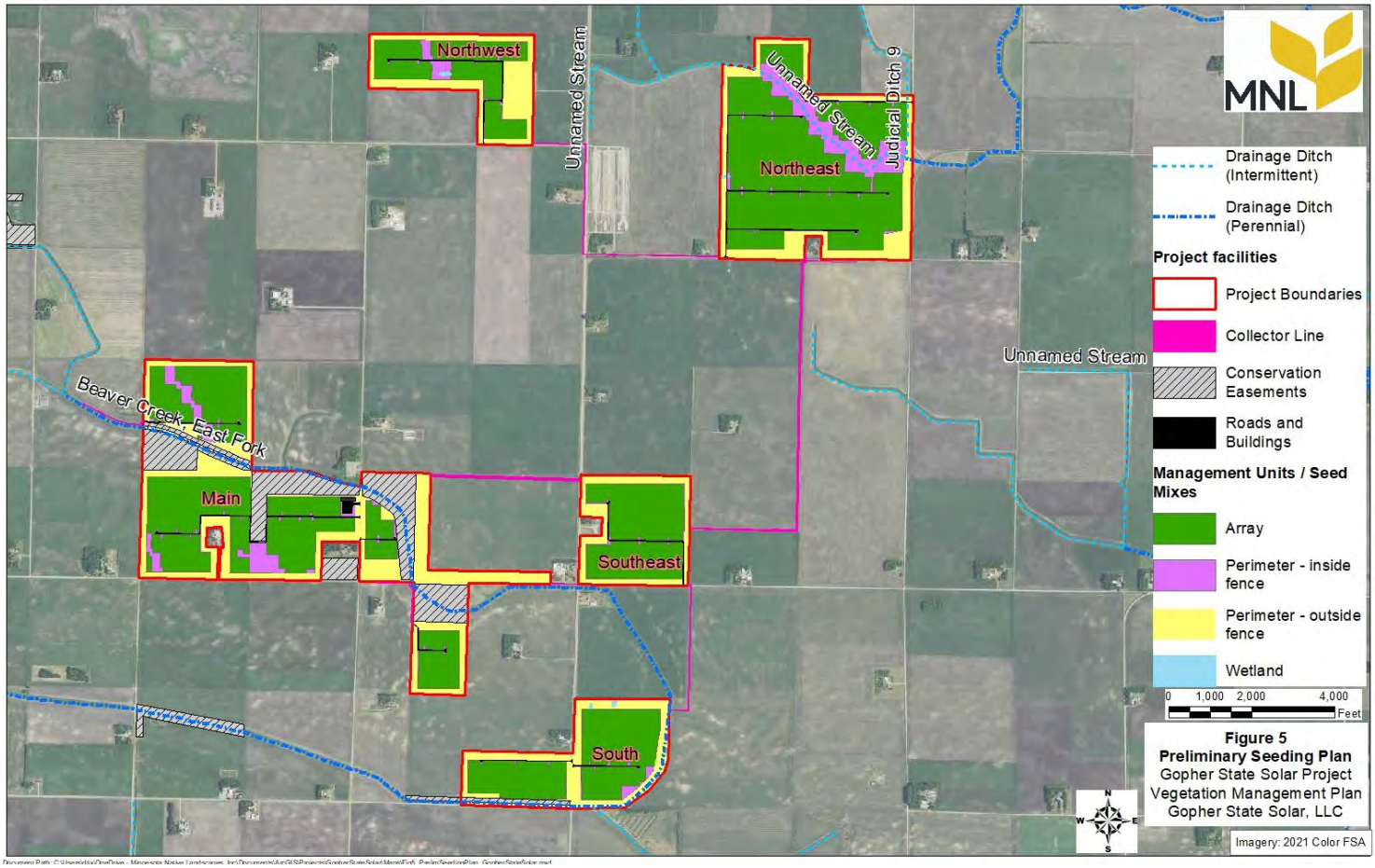
- Northwest and Northeast Units: these are separated from the others by about 1 mile. The Northeast unit has an unnamed stream and section of Judicial Ditch 9 flowing through it, portions of which are within the fenced area. There will be a buffer separating the ditch channel from the arrays and other infrastructure.

Each of the blocks will be managed with the same goals and objectives and each has the same management unit types within the blocks. There are four different management units spread throughout the Site and with portions of each within each block of land. These management units are shown in Figure 5 and described based on the different objectives for each.

The four management units are as follows:

A. Array Vegetation Management Unit (VMU) will be short-statured non-native, perennial vegetation that will not interfere with the operation of the solar panels.
    a. This will have grasses and wildflowers (clovers, etc.) that provide nectar sources for native species of pollinators.
B. Perimeter Shortgrass VMU will primarily be within the fenced areas.
    a. This area will have native species that should remain shorter than 3 feet tall and will include grasses and diverse forbs.
    b. This will provide high-quality native prairie habitat.
C. Perimeter Mixed Height VMU will be primarily outside the fenced area and may include some areas within the fenced area near ditches but separate from most operational areas.
    a. This area will have native species that include some species taller than 4 feet and will include grasses and diverse forbs.
    b. This will provide high-quality native prairie habitat.
D. If needed, Wetland VMU will be composed of native vegetation within existing delineated wetlands.
    a. This is a relatively small area but will include species adapted to saturated soils and periods of shallow inundation.
    b. This will be an area of high diversity of native plant species.

Figure 5. Preliminary Seeding Plan



3.1 Management Unit Objectives

Establishment period and long-term management objectives are defined independently for the Array VMU because it is within the operational area of the Project and will require additional intensive management. The objectives for the other management units will be the same for all three VMUs.

The Array VMU is unique because the vegetation in this area must remain lower to the ground to prevent shading the solar panels. Therefore, a non-native and low growing seed mix will be used and supplemented with nectar-producing species that are beneficial to pollinators. Additional management activity is expected within the arrays to maintain vegetation at a low height to prevent interference with operation of the panels.

3.1.1 Array VMU Objectives

The objectives below apply only to the Array VMU (Appendix A) which will occur within the solar arrays including under the solar panels and in the main lanes between panels.

Short-term objectives:

- Minimize soil disturbance and ensure appropriate seedbeds with minimal compaction and mixing with subsoil.

- Comply with the Stormwater Pollution Prevention Plan (SWPPP) and Construction Stormwater General Permit by using appropriate BMPs and carefully monitoring construction activities.
- Install seed mixes that include low-growing grasses and wildflowers that will not interfere with solar operations to allow for minimal long-term maintenance needs.

Long term objectives:

- Maintain vegetation to prevent invasive plant species and other undesirable plants.
- Monitor annually to assess conditions and identify problems to be addressed through management activities.

3.1.2 Perimeter and Wetland VMUs Objectives

The objectives below apply only to the Perimeter Inside Fence, Perimeter Outside Fence, and Wetland VMUs which will occur outside the solar arrays in other portions of the Site.

Short-term objectives:

- Minimize soil disturbance and ensure appropriate seedbeds with minimal compaction and mixing with subsoil.
- Comply with the Stormwater Pollution Prevention Plan (SWPPP) and Construction Stormwater General Permit by using appropriate BMPs and carefully monitoring construction activities.
- Install seed mixes that include a high diversity of native grasses and forbs that will provide high quality habitat for native pollinators. Specifically, these mixes will each include a minimum of:
    - 25% wildflower seed by number of seeds
    - 25 native species
    - 3 forbs that bloom in each portion of the growing season: early, mid, and late

Long term objectives:

- Maintain vegetation to prevent invasive plant species and other undesirable plants.
- Monitor annually to assess conditions and identify problems to be addressed through management activities.

4.0 Vegetation Establishment and Management

The following vegetation establishment guidelines are based on observations of the status of the Site, a review of historical Site use, expected conditions prior to and during construction, construction timelines, and qualified contractor experience.

4.1 Contractor Qualifications

Seeding contractors must have at least 5 years of experience installing native seed including installation within solar array projects in Minnesota or the upper Midwest. Contractor will provide references demonstrating the ability to successfully perform similar work on utility scale solar projects. Seeding and Site management contractor(s) to be assigned; contractor(s) will be assigned prior to Project construction. All herbicides will be applied by Minnesota Department of Agriculture (MDA) licensed commercial applicators according to manufacturer's directions.

4.2 Site Preparation

BMPs will be installed before and during grading activities including placement of erosion control measures. Areas with existing vegetation will be avoided during construction to the degree feasible to protect already established vegetation on the Site as long as that vegetation does not include undesirable species. If possible, Gopher State Solar may work with landowners to pre-treat areas with invasive species or other undesirable plants in the prior growing season. Any necessary tree clearing, grubbing and stump removal will be completed only where necessary and Site grading will be completed in accordance with the Site plans but in a manner that minimizes overall soil disturbance and reduces the movement of soil as much as possible.

Topsoil will be segregated during grading and redistributed across graded areas. Where necessary, all topsoil that has been impacted by construction activities will be decompacted with chisel plows, rippers, or tillers depending on the depth and severity of the compaction. Decompaction may be followed by disking to prepare a smooth, evenly textured soil surface.

If existing undesirable vegetation is present, preparatory herbicide treatments may be implemented. The spraying would be done approximately 14-21 days prior to scheduled seeding with an application of a non-specific herbicide to all live vegetation in the seeding area. A second herbicide treatment may be applied to any significant areas of undesirable vegetation still growing 14 days after the first herbicide application. Drift would be minimized by utilizing appropriate equipment calibrated to be conducive to the weather conditions at the time of treatment.

4.3 Seeding

If possible, seed should be installed prior to construction. This will help to establish vegetation that will maintain soil stability during construction and prevent erosion as well as maintain a cleaner working area for most of the equipment. Construction will inevitably result in some disturbance to these seeded areas, much of which may require re-seeding after completion of the work in that area.

All seed will be installed using a Truax no-till drill or Trillion type seeder (or similar) specific to native seed mixes. Where drill-seeding is not practical due to Site conditions including the presence of solar panels and posts, seed will be broadcast onto the soil surface using a Vicon seeder (or similar) and raked to ensure good seed-to-soil contact.

Prior to seed installation, the seeding contractor will calibrate and adjust seeding equipment to sow seeds at the proper seeding rate. Equipment will be operated in a manner to confirm complete coverage of the entire area to be seeded. Equipment will be steam cleaned or thoroughly washed prior to starting work to prevent contamination from outside seed sources.

4.3.1 Cover Crop

A cover crop-only seed mix may be installed into any open soils to provide for soil stabilization if there are disturbed soils left for more than 14 days without erosion control or permanent seeding. Cover crop seed mixes may include oats for seeding during the spring or summer, or winter wheat for seeding in the late summer or fall. The cover crops will be included in all

permanent seed mixes at a reduced rate.

4.3.2 Perennial Seed Mixes

Four seed mixes will be used for the Project and all are shown in Appendix A. The Array Non-Native Fescue/Clover/Bee Lawn Mix will be used with the solar arrays and is designed specifically to be low growing because the solar panels may be as low as 18 inches off the ground, which would be shaded by most diverse native seed mixes based on current seed availability. This mix will include wildflower species that will provide nectar sources for many pollinator species, which ensures that this area will still be pollinator friendly.

The other three seed mixes are composed of a high diversity of native grasses, sedges, and forbs and will all provide quality restored prairie habitat for native pollinator species. The planting areas of each of these mixes is shown in Figure 5 according to the VMUs.

Prior to or shortly after the planting of native species, Gopher State Solar will contact each landowner with property directly adjacent to the Site to inform them of the native plants on this Site. Gopher State Solar will request that the landowner use care to minimize pesticide drift. A buffer zone will not be maintained. Pesticide drift from neighboring lands may reduce the diversity in the areas near the edge of the Site but it is not expected to drastically affect the overall diversity in a meaningful way.

4.3.3 Seed Substitutions

Certain species in the proposed seed mixes may not be available when installation is planned. If necessary, any substitution will be approved by Gopher State Solar and will be consistent with this VMP's stated goals and objectives.

4.3.4 Landscape Screening Areas

Gopher State Solar will work with adjoining landowners to identify potential landscape screening needs and to implement such screening upon request. Table 2 shows possible trees and shrubs to use for screening, other species may be used depending on availability. Native tree and shrub species will be preferred.

Table 2. Potential Woody Plants for Screening at Gopher State

Scientific name	Common name	Container size	Spacing (ft.)
Deciduous and Coniferous Trees			
Crataegus mollis	Downy hawthorn	10#	15
Juniperus virginiana	Eastern red cedar	10#	15
Pinus banksiana	Jack Pine	10#	15
Quercus marcrocarpa	Bur oak	10#	15
Deciduous Shrubs			
Amelanchier arborea	Downy Serviceberry	5#	6
Physocarpus apulifolius	Common ninebark	5#	6
Cornus racemosa	Gray Dogwood	5#	6
Corylus americana	American Hazelnut	5#	6
Prunus americana	American Plum	5#	6
Rhus glabra	Smooth sumac	5#	6
Viburnum rafinesquianum	Downy arrowwood viburnum	5#	6

4.3.5 Approximate Management Timeline

These guidelines are general standards for pollinator-solar vegetation management, and additional or fewer services may be required based on panel height and other to-be-determined Site conditions. Methods listed below will follow the techniques described in Section 6 and are informed by the management objectives of this VMP. The timeline applies to each area as the seeding and construction progresses, establishment Year 1 may differ across the Site due to the lag in initial construction and seeding progress.

Year 1 Maintenance - During the first year, vegetation in the seeded areas should be mowed 2-3 times throughout the growing season as needed to prevent weed seed production, remove shading from small plant seedlings, and prevent shading of solar modules. Herbicide will be used minimally and only as a spot-treatment on aggressive perennial weeds and woody plants during the first year, with mowing utilized as the primary method of controlling undesirable species.

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

Year 3 Maintenance – During the third-year, vegetation in the seeded areas may require mowing 1-2 times throughout the growing season for control of tall-growing annual weeds, woody species, or perennial/noxious weeds at risk of producing seed prior to herbicide application. Height-reduction mowing of the array area or portions thereof may be required in mid-summer

to prevent shading of modules. 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 4/5 Maintenance – During the fourth and fifth years, the vegetation management strategy will shift to minimizing impact on the desirable plant community while controlling noxious weeds and woody species and preventing shading of panels. Mowing during the growing season may be required to remove shading and control weeds. Targeted herbicide treatment will continue 1-2 times during the growing season. Volunteer tree seedlings will be removed via cutting and stump treating which is preferred over foliar spraying for effectiveness and prevention of non-target impacts.

Long-Term Maintenance – During the long-term maintenance phase (after year 5 assuming proper establishment), depending on Site conditions and vegetation management needs, the Site may be cleared of thatch on a rotational basis. This will be done by haying, mowing, or grazing. Hayed vegetation should be removed only by approved contractors or personnel. Mowing should be done with a flail-type implement to thoroughly chop cut vegetation and minimize thatch accumulation unless the hay will be collected. High-impact grazing, if implemented, should aim to defoliate 90% or more of the vegetation and clear 90% of the accumulated thatch layer. The same area will be cleared on a rotation, with no area cleared at the same time two years in a row.

5.0 Invasive Species and Noxious Weed Management

Invasive and undesirable plant species will be controlled by Gopher State Solar for the life of the Project. Any species listed on the state noxious weed list maintained by the MDA (2023) will be controlled in accordance with Minnesota and Renville County noxious weed rules and regulations. Invasive plant species include those on the Minnesota Department of Natural Resources (MDNR) lists (MDNR 2023). Other undesirable species include those that are problematic for the operation of the Project.

5.1 Invasive Species Prevention

Before machinery and equipment is transported onto the Site it will be inspected by the monitor for potential undesirable seed. Any plants, seeds, mud, dirt clods, and animals will be removed through washing to prevent the import of undesirable seeds to the Site. Any equipment that arrives on the Site that is not properly cleaned will be sent away to an off-Site location for cleaning and inspection before returning. During construction, weed management will be achieved through a combination of herbicide applications and mowing to control the production of undesirable seeds. This will include areas within the control of Gopher State Solar.

6.0 Management Methods

A variety of vegetation management techniques will be implemented on the Site when necessary, based on the timeline in Section 4.3 and adjusted per recommendations from the vegetation management and monitoring contractor(s). Methods will be selected to provide the best control possible of noxious, invasive, and woody species while minimizing impacts on seeded species and ensuring vegetation does not shade or interfere with solar modules and equipment. All weeds on the Minnesota State Noxious Weed List (MDA 2023) will be managed per their designation

category on the list at the time of the inspection, i.e., eradicate or control.

6.1 Adaptive management

Some of the management methods may be tested on small areas before implementing across broader sections to better understand if certain approaches work better than others for the specific conditions. Therefore, implementation of certain measures may be completed over multiple years before it is expanded to the full Site.

6.2 Mechanical Mowing

Areas that require mowing will be determined by the management contractor and Gopher State Solar. Mowing will be accomplished by agricultural tractors with flail or rotary mower attachments, zero-turn mowers, and/or other mechanical option(s) as approved by Gopher State Solar. Flail mower implements are preferred to mulch the cut material and avoid forming a mat of cut vegetation which could smother desirable plant growth. Other mechanical cutting implements may be used if haying is expected to follow the mowing operation. Where appropriate, mower height should be at least 6-9" from the ground to avoid damaging flowering plants.

Haying would include mowing but would be followed by mechanical removal of the cut thatch material. This is beneficial for the Site to minimize the accumulation of material that may pose wildfire risks. In addition, removing the thatch is beneficial for the growth of many species because it allows new seedlings to become established. This method will only be used where practical for access with the necessary equipment.

6.3 Weed Whipping

Weed whipping may be used to remove excessive vegetation growth in areas that are difficult to access with mechanical mowing equipment or for plants that are not impacted by grazing sheep. These areas may include directly underneath solar panels, around pilings, underneath tracker drivelines or above-ground cabling, around sensitive electrical equipment, around gates/entrances, along fencelines, in wet or steep areas, in areas with biologs or other BMPs, and around screening trees/shrubs.

6.4 Grazing

Gopher State Solar is maintaining the option to utilize grazing as a management tool for the project. Sheep grazing can be implemented in place of mowing to manage vegetation height or density. Grazing provides many of the same impacts as mowing including decreasing vegetation height and module shading but with the added benefit of doing so immediately adjacent to and underneath sensitive equipment. In addition, grazing helps to remove the vegetative thatch from the Site, reducing the risk of wildfires.

Sheep grazing also re-introduces valuable services for the overall health of the vegetation by recycling nutrients and has been shown to increase soil carbon and nutrients when grazing in native vegetation (Towner et al. 2021). Grazing intensity and timing will vary based on vegetation type and management objectives. Native plantings and targeted noxious weed programs subject to a high-impact grazing should aim to defoliate at least 90% of the vegetation. This requires relatively high stocking density and a limited time within a given paddock, ideally less than four

weeks. Cool-season-dominant or forage plantings may be subject to low-intensity or continual grazing. Dormant-season grazing events may be recommended to further reduce thatch at any location.

6.5 Herbicide applications

Herbicides are an effective weed management tool. While mowing/grazing controls annuals and may provide short-term control for some perennials, most invasive species and other undesirable plants must be treated with herbicide to provide effective control. Herbicide treatment will reduce populations, prevent the spread of weed seeds, and kill vegetation that may be encroaching or shading modules and electrical equipment.

Herbicide treatments will begin as needed based on weed populations if extensive perennial weeds or woody species are present. Ongoing annual herbicide applications will likely be required into the long-term maintenance phase to continue providing control of woody and noxious species introduced to the Site from surrounding landscapes. Selective herbicide application, using herbicides formulated for specific plant groups, and spot herbicide application, applying herbicide directly to the foliage of target plants, are preferred over broadcast and non-selective applications in pollinator habitat. These techniques will ensure good control of invasive species while minimizing off-target damage to desirable plants. If broadcast applications are recommended, the most selective herbicide will be utilized and the application will be limited to the minimum effective area. If non-selective herbicides are required for certain weed species, their use will be limited to the minimum effective area and application method.

In addition to herbicide treatment for weeds, pre-emergent and non-selective herbicides may be applied to specific areas of the Site (around electrical equipment and along roads/gravel) to maintain bare ground. Herbicide treatments for bare ground include a chemical adjuvant to increase soil deposition/adsorption and prevent runoff.

All herbicide applications will be completed per manufacturer label instructions, and all applicators will hold a valid State of Minnesota Pesticide Applicator License.

6.6 Supplemental seeding

Supplemental seeding may be necessary where vegetation establishment does not meet requirements of this VMP. Establishment failure can occur for a variety of reasons including compacted soil conditions, flooding, drought, and extensive weed competition. Depending on the reason(s) for failure, recommendations may be provided to adjust species in the re-seeding mix to better accommodate growing conditions in the specific area.

If temporary disturbance is necessary after final construction (such as excavating or trenching for repairs or maintenance), the seeding contractor will work with Gopher State Solar to choose an appropriate seed mix for these areas.

If certain areas are continually impacted by maintenance activities (such as travel paths) and initially seeded species fail to thrive, these areas may be re-seeded with species that can tolerate a higher level of disturbance.

Seed selection and rate for supplemental seeding will be determined based upon present Site conditions. As needed, temporary cover crops may be installed. The timing and methodologies of supplemental seeding will be determined for each specific situation based on the conditions, scope and other mitigating factors.

7.0 Monitoring

Site monitoring will be conducted by a qualified restoration ecologist. Monitoring will evaluate the establishment of seeded species, identify invasive, noxious, and woody species presence, check for erosion or other Site issues, and determine vegetation maintenance needs and timing. These monitoring visits will occur three times per year/growing season during the early establishment period (years 1-3) and once per year/growing season thereafter.

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

Qualitative monitoring will be completed at each of the monitoring Site visits, beginning in Year 1. This will include a general review of the Site, often directed by on-Site personnel and management contractors with familiarity with conditions. This review will document problematic areas with populations of noxious and invasive species, tree seedlings, erosion issues, etc. This information will be documented to direct vegetation management contractors to address each issue.

Quantitative monitoring will be completed once each year/growing season, beginning in Year 3 and continuing for 10 years or until it is determined that monitoring is no longer needed. This monitoring will use timed-meander surveys within approximately 20 separate Assessment Areas (AAs) each no larger than 20 acres. The AAs will be mapped from desktop with the intention of selecting representative portions of the Site that include at least 20 percent of the full area. Each will be within a unique vegetation area and VMU. Within each AA, an ecologist will walk for 20 minutes and document all species encountered. At the end of the 20-minute walk, cover will be estimated for each species observed. These data will be used to assess cover of invasive and noxious species, seeded species, and other species present from year to year.

7.1 Performance Standards

Quantitative monitoring will be used to assess the vegetative cover relative to the following performance standards:

- All vegetated areas have at least 90% vegetative cover not including roads, etc.
- Vegetative cover within the Array VMU must have 80% cover by desirable species.
- Noxious weeds and invasive species will not exceed 10% cover.
- Each VMU with native vegetation must meet the following:
    - At least 70% cover by native species
    - At least 15 native species have 1% or greater cover.
    - Forbs make up at least 15% cover.

- At least 3 plants are present that bloom in early summer and 3 that bloom in late summer.

Areas that fail to meet these performance standards must be treated accordingly to remediate the issues. This may include re-seeding or installing live plants if necessary.

8.0 References

MDA. 2023. Minnesota Noxious Weed List. https://www.mda.state.mn.us/plants-insects/minnesota-noxious-weed-list

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Minnesota Board of Water and Soil Resources ("BWSR"). 2023. Minnesota Habitat Friendly Solar Program. Accessed January 2024 at https://bwsr.state.mn.us/minnesota-habitat-friendly-solar-program.

Minnesota Department of Commerce. 2021. Guidance for Developing a Vegetation Establishment and Management Plan for Solar Facilities. Division of Energy Resources, Energy Environmental Review and Analysis. Accessed January 2024 at https://apps.commerce.state.mn.us/eera/web/project-file/11702.

Towner, E., Karas, T., Janski, J., Macknick, J. & Ravi, S. Managed sheep grazing can improve soil quality and carbon sequestration at solar photovoltaic sites. AGU Fall Meeting 2021. New Orleans : s.n., 2021.

Appendix A. Gopher State Solar VMP

Fescue lbs/ac:	57.60
Forb PLS lbs/ac:	2.40
Species Count:	6
Avg Height Range:	6-18"

Gopher State Solar
Array Mix
Renville Co MN

	Scientific Name	Common Name	% of Mix	PLS lbs/ac
Fescue:	Festuca ovina	Sheep Fescue	24.00	14.40
	Festuca ovina	Hard Fescue	24.00	14.40
	Festuca rubra commutata	Chewings Fescue	24.00	14.40
	Festuca rubra	Creeping Red Fescue	24.00	14.40
Forbs:	Prunella vulgaris	Self-heal	0.75	0.45
	Trifolium repens	Dutch White Clover	3.25	1.95

Appendix A. Gopher State Solar VMP

Gopher State Solar
Perimeter Short Native Mix (Inside Fence)
Renville Co MN

Grass PLS lbs/ac:	6.22
Sedge PLS lbs/ac:	0.23
Forb PLS lbs/ac:	2.56
Species Count:	36
Seeds/Sq. Ft:	63
Avg Height Range:	12-40"

	Scientific Name	Common Name	% of Mix	PLS lbs/ac	Bloom Season	Seeds/SF
Grasses:	Bouteloua curtipendula	Side-oats Grama	20.00	1.80		6.58
	Bouteloua gracilis	Blue Grama	4.00	0.36		5.29
	Bromus kalmii	Prairie Brome	4.00	0.36		1.06
	Elymus canadensis	Canada Wild Rye	3.00	0.27		0.52
	Elymus trachycaulus	Slender Wheat Grass	7.00	0.63		1.60
	Elymus virginicus	Virginia Wild Rye	9.10	0.82		1.26
	Schizachyrium scoparium	Little Bluestem	17.00	1.53		8.43
	Sporobolus compositus	Rough Dropseed	5.00	0.45		4.96
Sedges:	Carex brevior	Plains Oval Sedge	1.50	0.14		1.44
	Carex molesta	Troublesome Sedge	1.00	0.09		0.83
Forbs:	Achillea millefolium	Yarrow	0.20	0.02	Summer	1.16
	Agastache foeniculum	Fragrant Giant Hyssop	0.40	0.04	Summer	1.19
	Allium stellatum	Prairie Onion	0.40	0.04	Summer	0.15
	Amorpha canescens	Leadplant	0.75	0.07	Summer	0.40
	Anemone canadensis	Canada Anemone	0.20	0.02	Spring	0.05
	Asclepias syriaca	Common Milkweed	1.50	0.14	Summer	0.20
	Asclepias tuberosa	Butterfly Milkweed	0.50	0.05	Summer	0.07
	Astragalus canadensis	Canada Milk Vetch	1.00	0.09	Summer	0.56
	Chamaecrista fasciculata	Partridge Pea	3.00	0.27	Fall	0.27
	Coreopsis palmata	Prairie Coreopsis	0.50	0.05	Summer	0.17
	Dalea candida	White Prairie Clover	4.00	0.36	Summer	2.51
	Dalea purpurea	Purple Prairie Clover	5.20	0.47	Summer	2.58
	Desmodium canadense	Showy Tick-trefoil	2.00	0.18	Summer	0.36
	Drymocallis arguta	Prairie Cinquefoil	0.75	0.07	Summer	5.70
	Heliopsis helianthoides	Common Ox-eye	1.50	0.14	Summer	0.31
	Monarda fistulosa	Wild Bergamot	0.50	0.05	Summer	1.16
	Penstemon grandiflorus	Large-flower Penstemon	0.40	0.04	Spring	0.19
	Pycnanthemum virginianum	Mountain Mint	0.30	0.03	Summer	2.18
	Ratibida columnifera	Long-headed Coneflower	0.75	0.07	Summer	1.04
	Rudbeckia hirta	Black-eyed Susan	2.00	0.18	Summer	6.08
	Solidago nemoralis	Gray Goldenrod	0.20	0.02	Fall	1.98
	Symphyotrichum laeve	Smooth Blue Aster	0.50	0.05	Fall	0.91
	Symphyotrichum oolentangiense	Sky-blue Aster	0.50	0.05	Fall	1.32
	Tradescantia bracteata	Long-bracted Spiderwort	0.20	0.02	Spring	0.07
	Verbena stricta	Hoary Vervain	0.75	0.07	Summer	0.69
	Zizia aptera	Heart-leaf Golden Alexanders	0.40	0.04	Spring	0.16

Appendix A. Gopher State Solar VMP

Gopher State Solar
Perimeter Mixed Height Native Mix (Outside fence)
Renville Co MN

Grass PLS lbs/ac:	6.48
Sedge PLS lbs/ac:	0.09
Forb PLS lbs/ac:	2.43
Species Count:	40
Seeds/Sq. Ft:	60
Avg Height Range:	24-48"

	Scientific Name	Common Name	% of Mix	PLS lbs/ac	Bloom Season	Seeds/SF
Grasses:	Andropogon gerardii	Big Bluestem	7.00	0.63		2.31
	Bouteloua curtipendula	Side-oats Grama	15.00	1.35		4.93
	Bouteloua gracilis	Blue Grama	4.50	0.41		5.95
	Bromus kalmii	Prairie Brome	5.00	0.45		1.32
	Elymus canadensis	Canada Wild Rye	6.00	0.54		1.03
	Elymus trachycaulus	Slender Wheat Grass	5.00	0.45		1.14
	Elymus virginicus	Virginia Wild Rye	6.00	0.54		0.83
	Panicum virgatum	Switchgrass	3.00	0.27		1.39
	Schizachyrium scoparium	Little Bluestem	10.00	0.90		4.96
	Sorghastrum nutans	Indian Grass	7.00	0.63		2.78
	Sporobolus compositus	Rough Dropseed	3.50	0.32		3.47
Sedges:	Carex brevior	Plains Oval Sedge	1.00	0.09		0.96
Forbs:	Achillea millefolium	Yarrow	0.20	0.02	Summer	1.16
	Agastache foeniculum	Fragrant Giant Hyssop	0.40	0.04	Summer	1.19
	Allium stellatum	Prairie Onion	0.40	0.04	Summer	0.15
	Amorpha canescens	Leadplant	0.25	0.02	Summer	0.13
	Anemone canadensis	Canada Anemone	0.25	0.02	Spring	0.07
	Asclepias incarnata	Swamp Milkweed	0.50	0.05	Summer	0.08
	Asclepias syriaca	Common Milkweed	1.50	0.14	Summer	0.20
	Astragalus canadensis	Canada Milk Vetch	0.55	0.05	Summer	0.31
	Boltonia asteroides	False Aster	0.50	0.05	Fall	2.64
	Chamaecrista fasciculata	Partridge Pea	3.00	0.27	Fall	0.27
	Dalea candida	White Prairie Clover	4.00	0.36	Summer	2.51
	Dalea purpurea	Purple Prairie Clover	5.00	0.45	Summer	2.48
	Desmodium canadense	Showy Tick-trefoil	1.00	0.09	Summer	0.18
	Drymocallis arguta	Prairie Cinquefoil	0.30	0.03	Summer	2.28
	Eryngium yuccifolium	Rattlesnake Master	0.50	0.05	Summer	0.12
	Heliopsis helianthoides	Common Ox-eye	1.00	0.09	Summer	0.21
	Liatris pycnostachya	Prairie Blazing Star	1.00	0.09	Summer	0.36
	Monarda fistulosa	Wild Bergamot	0.50	0.05	Summer	1.16
	Penstemon grandiflorus	Large-flower Penstemon	0.50	0.05	Spring	0.23
	Pycnanthemum virginianum	Mountain Mint	0.40	0.04	Summer	2.91
	Ratibida pinnata	Yellow Coneflower	0.75	0.07	Summer	0.74
	Rudbeckia hirta	Black-eyed Susan	2.00	0.18	Summer	6.08
	Solidago rigida	Stiff Goldenrod	0.40	0.04	Fall	0.54
	Symphyotrichum laeve	Smooth Blue Aster	0.40	0.04	Fall	0.73
	Symphyotrichum oolentangiense	Sky-blue Aster	0.40	0.04	Fall	1.06
	Tradescantia bracteata	Long-bracted Spiderwort	0.20	0.02	Spring	0.07
	Verbena stricta	Hoary Vervain	0.70	0.06	Summer	0.65
	Zizia aurea	Golden Alexanders	0.40	0.04	Spring	0.15

Appendix A. Gopher State Solar VMP

Gopher State Solar
Wetland Native Mix
Renville Co MN

Grass PLS lbs/ac:	5.48
Sedge PLS lbs/ac:	0.57
Forb PLS lbs/ac:	1.94
Species Count:	35
Seeds/Sq. Ft:	166
Avg Height Range:	36-60"

	Scientific Name	Common Name	% of Mix	PLS lbs/ac	Bloom Season	Seeds/SF
Grasses:	Andropogon gerardii	Big Bluestem	9.00	0.72		2.64
	Calamagrostis canadensis	Blue-joint Grass	0.30	0.02		2.47
	Elymus virginicus	Virginia Wild Rye	18.00	1.44		2.22
	Glyceria grandis	Reed Manna Grass	3.50	0.28		8.21
	Leersia oryzoides	Rice Cutgrass	10.00	0.80		9.99
	Panicum virgatum	Switchgrass	4.75	0.38		1.95
	Sorghastrum nutans	Indian Grass	16.00	1.28		5.64
	Spartina pectinata	Prairie Cordgrass	7.00	0.56		1.36
Sedges:	Carex hystericina	Porcupine Sedge	1.00	0.08		0.88
	Carex stipata	Awl-fruited Sedge	2.00	0.16		2.00
	Carex vulpinoidea	Fox Sedge	3.00	0.24		7.14
	Scirpus atrovirens	Green Bulrush	0.65	0.05		8.79
	Scirpus cyperinus	Woolgrass	0.50	0.04		24.98
Forbs:	Acorus americanus	Sweet Flag	1.00	0.08	Summer	0.19
	Asclepias incarnata	Swamp Milkweed	4.50	0.36	Summer	0.63
	Bidens cernua	Nodding Beggarstick	1.50	0.12	Summer	0.93
	Boltonia asteroides	False Aster	1.00	0.08	Fall	4.70
	Desmodium canadense	Showy Tick-trefoil	1.00	0.08	Summer	0.16
	Eutrochium maculatum	Joe-pye Weed	0.50	0.04	Summer	1.77
	Eupatorium perfoliatum	Boneset	0.75	0.06	Fall	5.51
	Helenium autumnale	Sneezeweed	0.75	0.06	Fall	2.87
	Liatris pycnostachya	Prairie Blazing Star	1.00	0.08	Summer	0.32
	Lythrum alatum	Winged Loosestrife	0.50	0.04	Summer	13.88
	Mimulus ringens	Monkey Flower	0.50	0.04	Summer	33.79
	Monarda fistulosa	Wild Bergamot	0.50	0.04	Summer	1.03
	Ratibida pinnata	Yellow Coneflower	1.50	0.12	Summer	1.32
	Silphium perfoliatum	Cup Plant	1.50	0.12	Summer	0.06
	Solidago rigida	Stiff Goldenrod	1.00	0.08	Fall	1.20
	Sparganium eurycarpum	Giant Burreed	2.00	0.16	Summer	0.03
	Symphyotrichum novae-angliae	New England Aster	0.75	0.06	Fall	1.45
	Thalictrum dasycarpum	Purple Meadow Rue	0.75	0.06	Summer	0.44
	Verbena hastata	Blue Vervain	2.00	0.16	Summer	5.47
	Vernonia fasciculata	Ironweed	0.30	0.02	Summer	0.21
	Veronicastrum virginicum	Culver's Root	0.50	0.04	Summer	11.75
	Zizia aurea	Golden Alexanders	0.50	0.04	Spring	0.16