



Vegetation Installation and
Management Plan for SV CSG Mankato
North 1, LLC

Prepared January 2025 by:



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1. Mankato North 1 Vegetation Management Plan (VMP) Overview

1.1. Site Developer

Sunvest
N27 W24025 Paul Ct. Suite 100
Pewaukee, WI 53072
262.547.1200

1.2. Site Address

23759 3rd Ave
Mankato, MN 56001

1.3. Vegetation Restoration Consultant

Natural Resource Services, Inc
2885 Quail Road NE
Sauk Rapids, MN 56379
320.290.5363

and

16425 W. State Route 90
Princeville, IL 61559

1.4. Project Description

The proposed Mankato North 1 project is a 1 MVA AC project planned for approximately 6 acres of land within the solar site footprint and about 7 acres in the entire parcel. The site is located in Blue Earth County, Mankato, MN. No wetlands have been delineated within the parcel boundary. Vegetative screening is also not planned at this time. A stormwater basin will be implemented on site.

Tracker-style panels with approximately 30" ground clearance at max tilt and above-ground drivelines are planned. The site will also be planted with a fully-native pollinator mix to achieve the Habitat Friendly Solar status as defined by the Board of Water and Soil Resources (<https://www.revisor.mn.gov/statutes/cite/216B.1642>).¹

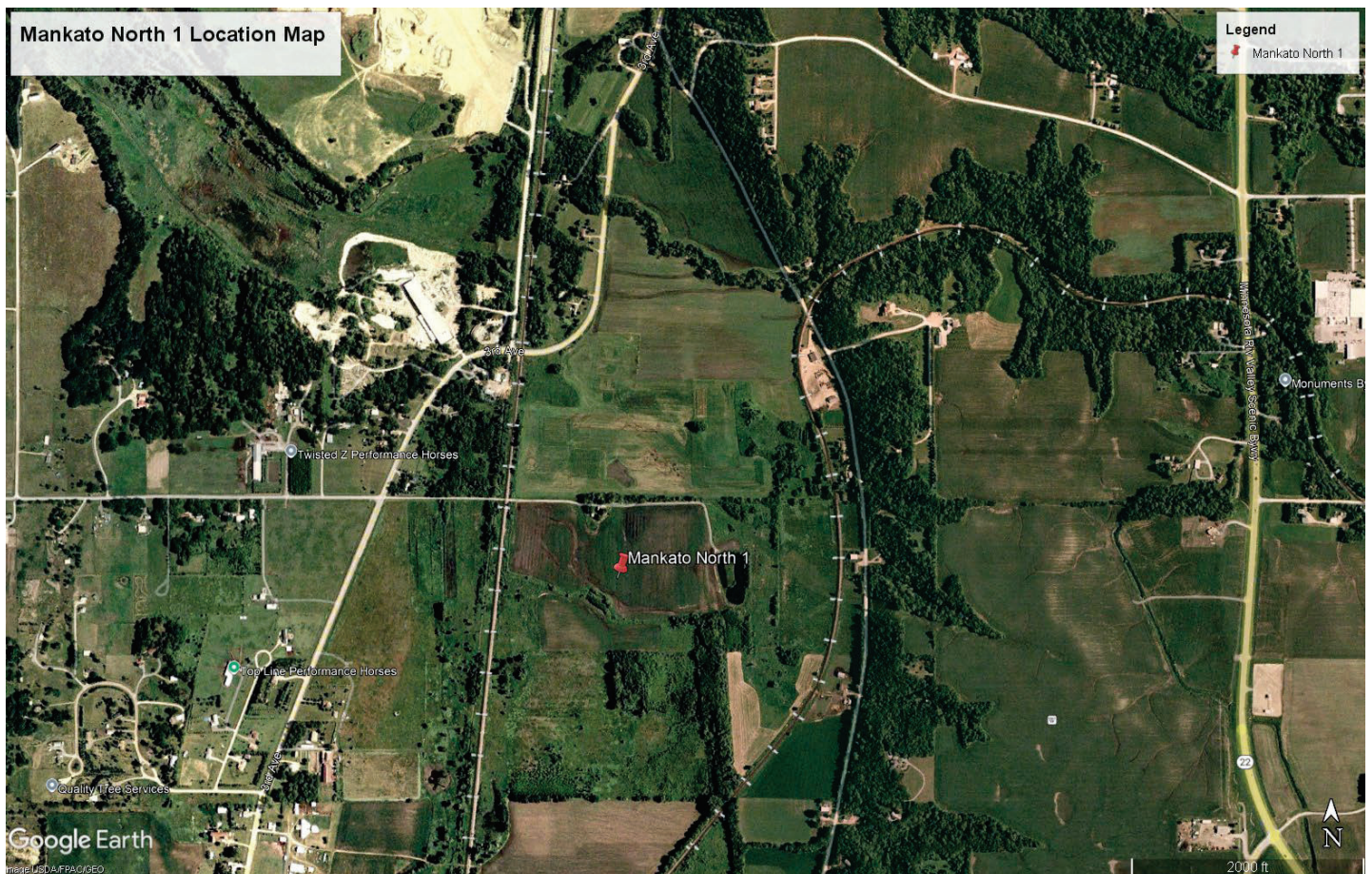
1.5. VMP Use and Objectives

The VMP was written to provide a brief overview and description of the project and to act as a guide for vegetation installation and management. It has been custom-written based on information known at the time of writing. The VMP should be treated as a living document and adjusted as additional information about the site is gathered both pre and post construction. A qualified native vegetation contractor with a history of success working on native vegetation restorations should be contracted to implement the procedures outlined in this document and to provide feedback and suggestions for the VMP during the lifespan of the project.

2. Site Information

2.1. Site Location

The Mankato North 1 project site is about a ½ mile to the east of the intersection of 238th Lane and 3rd Ave. and is situated approximately a ¼ mile away between two railroads. The Mankato Regional Airport is about 2.75 miles to the east. The GPS coordinates for this site are 44.223241, -93.979469. Outside of the parcel boundary to the north and east are delineated wetlands; trees are also present near the southern border of the parcel.



3. Overview of Vegetation Establishment and Management

3.1. Vegetative Goals

The primary vegetative goal is to establish permanent vegetation that does not interfere with solar production. This solar site is being planted with 100% native species. The species chosen produce an emphasis on native pollinator habitat to achieve and maintain the Minnesota Habitat Friendly Solar status.

3.2. Contribution of Native Habitat on Solar Sites

Economical production of power is the foremost goal of solar sites. There is a parallel opportunity to provide critically important native pollinator-friendly habitat throughout the array while capitalizing on the long-term low maintenance needs of native vegetation.

Establishing prairies and other native plant communities within the confines of solar sites provides a tremendous opportunity to restore ecosystems that have been severely degraded or eliminated across all areas of the country.

Native plants have profound root systems, many reaching 12 or more feet deep into the soil. Rainwater follows those roots into the ground, helping to reduce water runoff and promote the drainage of standing water into an aquifer. Those deep roots also stabilize the soil, preventing erosion from rain and wind. The plants provide seeds for songbirds, cover for game birds and, of course, provide blossoms and host plants for our beloved butterflies and other nectar-loving insects.

Native grasses and forbs will be selected based on their ecological appropriateness to the specific conditions of this site, with consideration to their mature height to not interfere with panel productivity. These species will not require irrigation, fertilizer, or other soil amendments.

The contribution to habitat restoration cannot be overstated given the acreage impacted and lifespan of the project.



3.3. Vegetation Installation Overview

The native mix planned for this array is selected for ecological appropriateness to the soil types, soil moisture, and site conditions. The native mix chosen keeps mature plant height of 24" to 36" so as to not interfere with panel productivity. The habitat provides low-maintenance vegetation that won't require fertilizer, amended soils or irrigation on this site.

It is important to note that the species selected for this site are based on their ability to successfully establish from seed and thrive within the unique conditions found on solar sites. From a practical standpoint, the species contained in these mixes are generally available in the marketplace and, as a whole, have reasonable price points. Ultimately, the list consists of well-performing, workhorse species coupled with smaller amounts of more unique species for a robust mixture.

3.4. Vegetation Management Overview

Maintenance plays a vital role in the eventual success of any native landscape installation, especially during the establishment period of years one through three. Active management is similar in all areas of the project site. All areas of the site are inspected annually followed by maintenance necessary to encourage healthy native species while discouraging non-native/invasive species. During the growing season of the first year of establishment, the site shall be inspected a minimum of three times.



4. Vegetation Installation Procedures

4.1. Site Inspections and Monitoring

Site inspections and monitoring throughout the installation process are vital to continually assess site conditions and determine what procedures are needed and the timing of those procedures. The pre-construction site inspection is particularly important to determine the need for any herbicide application or mowing prior to soil preparation and seeding.

4.2. Site Preparation Herbicide Application

A site preparation herbicide application, if deemed necessary, should be performed by a licensed, qualified contractor using appropriate herbicides to kill all actively growing weeds on the project site. Typically, only glyphosate herbicide is necessary, but if certain perennial weed species are present such as Canada thistle, a broadleaf additive may be necessary. The contractor should carefully select an herbicide with a short soil residual, such as Garlon 3A, to minimize the impact on germination of the permanent seeding. The vegetation should not be disturbed for a minimum of 14 days after an herbicide application to allow time for effective weed elimination.

4.3. Site Preparation Mowing

Site preparation mowing may be required to reset vegetative growth to prepare for an herbicide application. Additionally, site preparation mowing may be needed to cut and mulch vegetation to simplify the soil preparation and seeding process.

4.4. Soil and Seedbed Preparation

Soil and seedbed preparation is vital to the success of any planting. Disking and harrowing (or raking) the site is common and extremely effective. If extreme compaction is present on site, a ripper may be needed to mitigate the compaction. The seedbed should be relatively smooth and firm prior to seeding. Soil that is too clumpy or too fluffy may result in seeds being planted too deep in the soil to germinate and survive.

4.5. Seed and Seeding

A custom native pollinator seed mix has been designed for use on this project and is found in section 8. Seeding will be completed through broadcasting by using a mechanical spreader appropriate for the specified seed mixes. Large and fluffy seeds (such as most grasses and cover crop) should be broadcast first and then lightly harrowed/raked into the soil. Following the harrowing, small seeds (such as most forbs, sedges, and rushes) should be broadcast on top of the soil.

4.6. Erosion control

Erosion control measures should be implemented as required after permanent seeding is completed.

5. Vegetation Management Procedures

5.1. Adaptive Management

An adaptive management strategy is vital to the success of any project, but especially so for native pollinator restorations. Adaptive management consists of continual monitoring and adjusting maintenance strategies based on the site conditions in order to achieve the best outcomes. No two sites are exactly the same and responding to changing site conditions, weed pressures, weather, and a multitude of other variables is essential to the success of the planting.

5.2. Complete Site Maintenance Mowing

Complete site maintenance mowing consists of mowing the entire project area during the growing season, including trimming as appropriate around equipment or in inaccessible areas. Complete site maintenance mowing is implemented primarily during the establishment phase of the restoration (years 1-3) for several reasons. First, if a closed canopy of vegetation develops, mowing is implemented to knock back the taller vegetation and allow sunlight to reach the native seedlings below. Second, if weed species are present and actively nearing their seed set, mowing is implemented to prevent those weeds from producing viable seed. Third, vegetation has become tall enough to shade the panels or impact other solar equipment on site and must be cut down.

5.3. Integrated Vegetation Maintenance

Integrated vegetation maintenance or IVM is a method using a combination of targeted mowing/trimming and herbicide application aimed at reducing or eliminating weed species and promoting the desired vegetation. IVM is implemented starting towards the end of the 2nd full growing season typically and is used throughout the life of the project. 3 IVM visits are typical on most sites until year 5 when a reduction to 1-2 visits per year can be made if site conditions allow.

5.4. Dormant Mowing

Dormant mowing is a type of complete site mow implemented when vegetation is not actively growing on site. This method is typically performed in early spring or fall. Oftentimes, dormant mows are completed in the fall to mulch up dead vegetation and encourage decomposition. This practice also has a dual purpose of cleaning up the site to make electrical maintenance easier and to reduce the chance of accidental fire.

6. Vegetation Installation and Management Timeline

6.1. Site Prep and Installation Phase

Site Preparation:

1. Prior to the start of construction, a cover crop may be seeded to aid in erosion control, soil moisture management, and weed suppression.
2. Inspection of the project area to assess site conditions and determine the need for any site prep mowing or spraying activities.
3. If necessary, an herbicide application will be completed using glyphosate (Round-up® or equivalent) as per manufacturer's directions in areas with actively growing vegetation. Allow a minimum of 14 days before disturbing the soil or completing seeding activities.
4. When perennial broadleaf vegetation is present a triclopyr herbicide will be added (Garlon 3A® or equivalent) as per manufacturer's directions. When a broadleaf herbicide is used allow a minimum of 30 days before disturbing the site or completing seeding.
5. Depending on the density and type of undesirable vegetation present (i.e., annual vs perennial) a complete site mowing might be advisable in lieu of an herbicide application. For instance, if the site is dominated by Foxtail (an annual), mowing would be preferable to an herbicide application.

Soil Prep and Seeding:

1. Construction debris, garbage, and building materials will be removed and/or staged outside the intended seeding areas.
2. Disk soil within the project area in preparation for seeding. Harrow or rake the soil to achieve the proper seedbed.
3. Broadcast the large and fluffy seed (mostly grasses) along with a cover crop of winter wheat or oats.
4. Harrow or rake the soil to work the seed to a proper depth.
5. Broadcast the small seeds (forbs, sedges, rushes, small grass seeds) on top of the soil.

Installation Phase Maintenance

If the site is seeded in the summer or early fall, 1-2 complete site mowings may be needed during this first partial growing season.

6.2. Establishment Phase

Year 1 is defined as the 1st full growing season for the vegetation. A recommendation of 3 complete site mowings is most common for this phase. Depending on site conditions and vegetation growth, more or less may be needed.

Year 2 is the second full growing season. 3 total visits are typical with 2 complete site mowings and 1 Integrated Vegetation Maintenance visit the most likely combination.

Year 3 typically requires 3 IVM site visits depending on vegetation status.

6.3. Maintenance Phase

Year 4 – 34. During the maintenance phase, 2 IVM visits are typical.

7. Monitoring

Consistent project monitoring is essential to evaluate vegetative establishment, weed presence, and possible erosion concerns. This information helps determine which management procedures to utilize, the proper timing for those procedures, and whether any other remedial action is required such as reseeding or replanting. As the site's vegetation matures, adaptive management should be utilized as previously described.

8. Seed Mixes

Mankato North 1 Native Pollinator Seed Mix						
Seeding Rate- 13 PLS Lbs/acre- 91.4 seeds/ft ²						
Common Name	Scientific Name	Bloom Month	% of Mix	Seeds/ft ²	% Seeds / ft ²	PLS Lbs
Grasses						
Sideoats Grama	Bouteloua curtipendula		22.31%	6.4	6.99	2.900
Prairie Brome	Bromus kalmii		1.92%	0.7	0.80	0.250
Plains Oval Sedge	Carex brevior		2.31%	3.2	3.50	0.300
Pointed-broom Sedge	Carex scoparia		0.77%	3.1	3.38	0.100
Brown Fox Sedge	Carex vulpinoidea		1.54%	7.3	8.04	0.200
Silky Wild Rye	Elymus villosus		6.54%	1.7	1.88	0.850
Slender Wheatgrass	Elymus trachycaulus		4.62%	1.5	1.66	0.600
Little Bluestem	Schizachyrium scoparium		36.54%	26.2	28.63	4.750
Prairie Dropseed	Sporobolus heterolepis		0.38%	0.3	0.32	0.050
Graminoid Total			76.92%	50.5	52.20%	10.000
Forbs						
Anise Hyssop	Agastache foeniculum	Jun-Sep	0.09%	0.4	0.43	0.012
Common Yarrow	Achillea millefolium	Jun-Aug	0.58%	4.9	5.36	0.075
Nodding Onion	Allium cernuum	Jul-Aug	0.12%	0.0	0.05	0.015
Lead Plant	Amorpha canescens	Jun-Aug	1.33%	1.0	1.11	0.173
Canada Anemone	Anemone canadensis	May-Jun	0.06%	0.0	0.02	0.008
Wild Columbine	Aquilegia canadensis	Apr-Jun	0.06%	0.1	0.11	0.008
Common Milkweed	Asclepias syriaca	Jun-Aug	0.17%	0.0	0.04	0.023
Butterfly Milkweed	Asclepias tuberosa	Jun-Aug	0.14%	0.0	0.03	0.019
Canada Milkvetch	Astragalus canadensis	Jun-Aug	1.38%	1.1	1.23	0.180
Calico Aster	Symphyotrichum lateriflorum	Aug-Oct	0.12%	1.4	1.51	0.015
Cream Gentian	Gentiana flavida	Aug-Sep	0.23%	1.5	1.69	0.030
Partridge Pea	Chamaecrista fasciculata	Jul-Sep	2.31%	0.3	0.33	0.300
Prairie Coreopsis	Coreopsis palmata	Jun-Aug	0.29%	0.1	0.15	0.038
White Prairie Clover	Dalea candida	Jun-Sep	3.89%	3.5	3.85	0.506
Purple Prairie Clover	Dalea purpurea	Jul-Sep	5.77%	5.0	5.43	0.750
Prairie Blazing Star	Liatris pycnostachya	Aug-Sep	0.21%	0.1	0.12	0.027
Monkey Flower	Mimulus ringens	Jun-Sep	0.06%	6.3	6.93	0.008
Virginia Mountain Mint	Pycnanthemum virginianum	Jun-Sep	0.23%	2.4	2.65	0.030
Long-headed Coneflower	Ratibida columnifera	Jun-Aug	0.69%	1.4	1.52	0.090
Black-eyed Susan	Rudbeckia hirta	Jun-Oct	1.85%	8.1	8.86	0.240
Gray Goldenrod	Solidago nemoralis	Aug-Oct	0.06%	0.8	0.90	0.008
Ohio Spiderwort	Tradescantia ohiensis	May-Jul	0.10%	0.0	0.04	0.014
Hoary Vervain	Verbena stricta	Jun-Sep	0.58%	0.8	0.84	0.075
Golden Alexanders	Zizia aurea	Apr-Jun	2.77%	1.5	1.59	0.360
Forb Total			23.08%	41.0	44.80%	3.000
Mix Total			100%	91.5	100%	13.000

Mankato North 1 Basin Mix

Seeding Rate-6 lb/acre -135.3 seeds/ft²

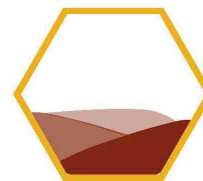
Common Name	Scientific Name	Bloom Month	% of Mix	Seeds/ft ²	% Seeds/ft ²
Grasses					
Virginia Wild Rye	Elymus virginicus		18.33%	1.70	1.25
Bottlebrush Sedge	Carex comosa		6.67%	4.41	3.26
Fringed Sedge	Carex crinita		6.67%	3.38	2.50
Pointed-broom Sedge	Carex scoparia		3.33%	6.17	4.56
Common Fox Sedge	Carex stipata		3.33%	2.50	1.85
Brown Fox Sedge	Carex vulpinoidea		3.33%	7.35	5.43
Fowl Manna Grass	Glyceria striata		0.33%	1.18	0.87
Fowl Bluegrass	Poa palustris		13.00%	37.25	27.53
Little Bluestem	Schizachyrium scoparium		20.00%	6.61	4.89
Graminoid Total			75.00%	70.53	52.13%
Forbs					
Canada Anemone	Anemone canadensis	May-Jun	1.51%	0.27	0.20
Calico Aster	Symphyotrichum lateriflorum	Aug-Oct	0.90%	1.31	0.97
Canada Milkvetch	Astragalus canadensis	Jun-Aug	3.09%	1.16	0.86
Nodding Bur Marigold	Bidens cernua	Aug-Oct	0.75%	0.35	0.26
Southern Blue Flag Iris	Iris virginica shrevei	Jun-Jul	1.51%	0.03	0.02
Great Blue Lobelia	Lobelia siphilitica	Jul-Oct	1.20%	13.28	9.81
Monkey Flower	Mimulus ringens	Jun-Sep	0.60%	30.54	22.57
Virginia Mountain Mint	Pycnanthemum virginianum	Jun-Sep	1.51%	7.30	5.40
Black-eyed Susan	Rudbeckia hirta	Jun-Oct	4.14%	8.40	6.21
Ohio Spiderwort	Tradescantia ohiensis	May-Jul	3.77%	0.66	0.49
Golden Alexanders	Zizia aurea	Apr-Jun	6.02%	1.46	1.08
Forb Total			25.00%	64.75	47.87%
Mix Total			100%	135.28	100%

9. Pollinator Scorecard



Solar Site Pollinator Habitat Assessment Form for Project Planning

For solar companies and local governments to meet pollinator/wildlife
habitat certification



1. PERCENT OF PROPOSED SITE VEGETATION COVER TO BE DOMINATED BY WILDFLOWERS

- ☐ 31-45 % +5 points
☒ 46-60 % +10 points
☐ 61+ % +15 points

Total points

Note: Projects may have "array" mixes and diverse border mixes; forb dominance should be averaged across the entire site. The dominance should be calculated from total numbers of forb seeds vs. grass seeds (from all seed mixes) to be planted.

2. PLANNED % OF SITE DOMINATED BY NATIVE SPECIES COVER

- ☐ 26-50% +5 points
☐ 51-75% +10 points
☒ 76-100% +15 points

Total points

3. PLANNED COVER DIVERSITY (# of species in seed mixes; numbers from upland and wetland mixes can be combined)

- ☐ 10-19 species +5 points
☐ 20-25 species +10 points
☒ 26 or more species +15 points

Total points

Exclude invasives from species totals.

4. PLANNED SEASONS WITH AT LEAST 3 BLOOMING SPECIES PRESENT (check/add all that apply)

- ☒ Spring (April-May) +5 points
☒ Summer (June-August) +5 points
☒ Fall (September-October) +5 points

Total points

See BWSR [Pollinator Toolbox](#) about bloom seasons

5. AVAILABLE HABITAT COMPONENTS WITHIN .25 MILES (check/add all that apply)

- ☐ Native bunch grasses for nesting +2 points
☒ Native trees/shrubs for nesting +2 points
☐ Clean, perennial water sources +2 points
☐ Created nesting feature/s (bee blocks, etc.) +2 points

Total points

6. SITE PLANNING AND MANAGEMENT

- ☒ Detailed establishment and management plan developed (see [example plan](#)) with funding/contract to implement +15 points
☐ Signage legible at forty or more feet stating pollinator friendly solar habitat (at least 1 every 20ac.) +5 points

Total points

7. SEED MIXES

- ☒ Mixes are composed of at least 40 seeds per square foot +5 points
☐ All seed genetic origin within 175 miles of site ([pg. 7-8 of Guidance](#)) +5 points
☐ At least 2% milkweed cover to be established from seed/plants +10 points

Total points

8. INSECTICIDE RISK

- ☐ Planned on-site insecticide use or pre-planting seed/plant treatment (excluding buildings/electrical boxes, etc.) -40 points
☐ Communication/registration with local chemical applicators about need to prevent drift from adjacent areas. +10 points

Total points

Grand Total

Provides Exceptional Habitat >85
Meets Pollinator Standards 70-84

Project Name: Mankato North I
Vegetation Consultant: Natural Resource Services, Inc
Project County: Blue Earth
Project Size: 7 acres
Projected Seeding Date: TBD Ending Permitting

Send completed forms, project plans, seed mixes and any communication with pesticide applicators to dan.shaw@state.mn.us

Note: Measurements of percent "cover" should be based on "absolute cover" defined as the percent of the ground surface that is covered by a vertical projection of foliage as viewed from above. To measure cover diversity it is recommended to use plots, and/or transects in addition to meander searches for accurate measurements. Wildflowers in question 1 refer to "forbs" which are flowering plants that are not woody, and are not graminoids (grasses, sedges, etc) and can include introduced clovers and other non-native species beneficial to pollinators.

10. Soils Maps



MAP LEGEND

Area of Interest (AOI)	Transportation
 Area of Interest (AOI)	 Rails
Soils	 Interstate Highways
Soil Rating Polygons	 US Routes
 Hydric (100%)	 Major Roads
 Hydric (66 to 99%)	 Local Roads
 Hydric (33 to 65%)	Background
 Hydric (1 to 32%)	 Aerial Photography
 Not Hydric (0%)	
 Not rated or not available	
Soil Rating Lines	
 Hydric (100%)	
 Hydric (66 to 99%)	
 Hydric (33 to 65%)	
 Hydric (1 to 32%)	
 Not Hydric (0%)	
 Not rated or not available	
Soil Rating Points	
 Hydric (100%)	
 Hydric (66 to 99%)	
 Hydric (33 to 65%)	
 Hydric (1 to 32%)	
 Not Hydric (0%)	
 Not rated or not available	
Water Features	
 Streams and Canals	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Blue Earth County, Minnesota
Survey Area Data: Version 22, Sep 7, 2024

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

Date(s) aerial images were photographed: Jul 2, 2023—Aug 8, 2023

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

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
35	Blue Earth mucky silt loam, 0 to 1 percent slopes	100	0.0	0.0%
85	Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	95	2.9	52.2%
160	Fieldon loam, 0 to 2 percent slopes	100	1.3	23.9%
181	Litchfield loamy fine sand, 1 to 3 percent slopes	4	1.3	23.2%
321	Tilfer silty clay loam	100	0.0	0.7%
Totals for Area of Interest			5.6	100.0%