

Appendix D  
*Vegetation Management Plan*





**Vegetation Management Plan  
for the  
Hayward Solar Project  
Freeborn County, MN**

April 2021



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## Hayward Solar Project

**Site Name & Location:** Hayward Solar Project, Hayward Township, Freeborn County, Minnesota

The Project is located on approximately 1,958 acres south of Interstate Highway 90, approximately 2 miles east of Hayward in Hayward Township, Freeborn County, MN. The Project is located within the Shell Rock River Watershed.

**Owner:** Hayward Solar LLC  
8800 N. Gainey Center Drive  
Suite 250  
Scottsdale, AZ 85258

**Contact:** Sean Sosa  
Project Engineer Associate  
Arevon Energy, Inc.  
Tel: 480.562.3398  
[ssosa@arevonenergy.com](mailto:ssosa@arevonenergy.com)

### **Vegetation Restoration Professionals:**

698 County Rd 6 NW  
Stanchfield, MN 55080

Mike Evenocheck  
Natural Resource Services, Inc.  
Tel: 763-656-8587  
[Mikeevo@naturalresourceservice.com](mailto:Mikeevo@naturalresourceservice.com)

Colleen Hollinger  
Natural Resource Services, Inc.  
Tel: 320.290.5363  
[Colleen@naturalresourceservice.com](mailto:Colleen@naturalresourceservice.com)



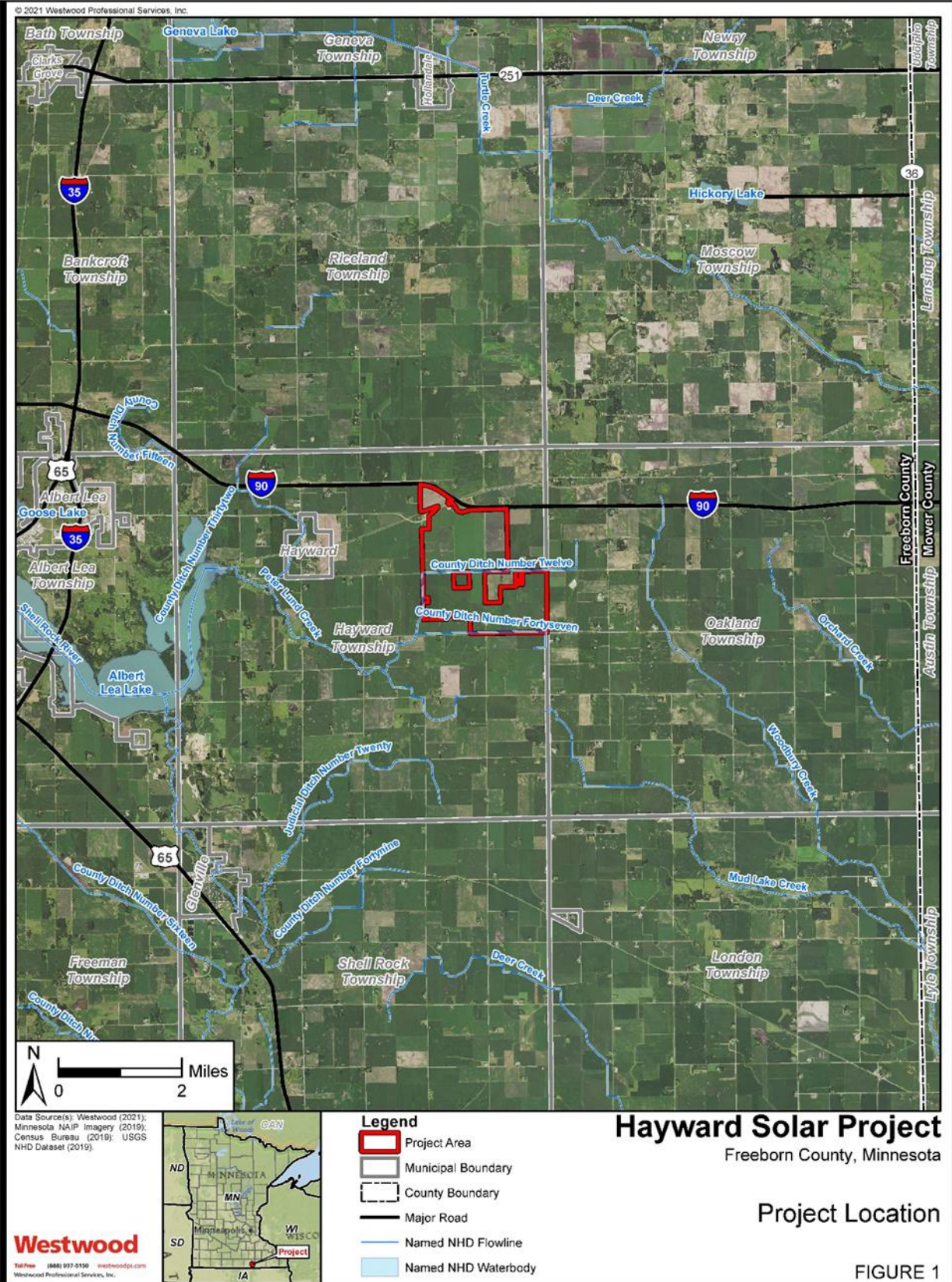
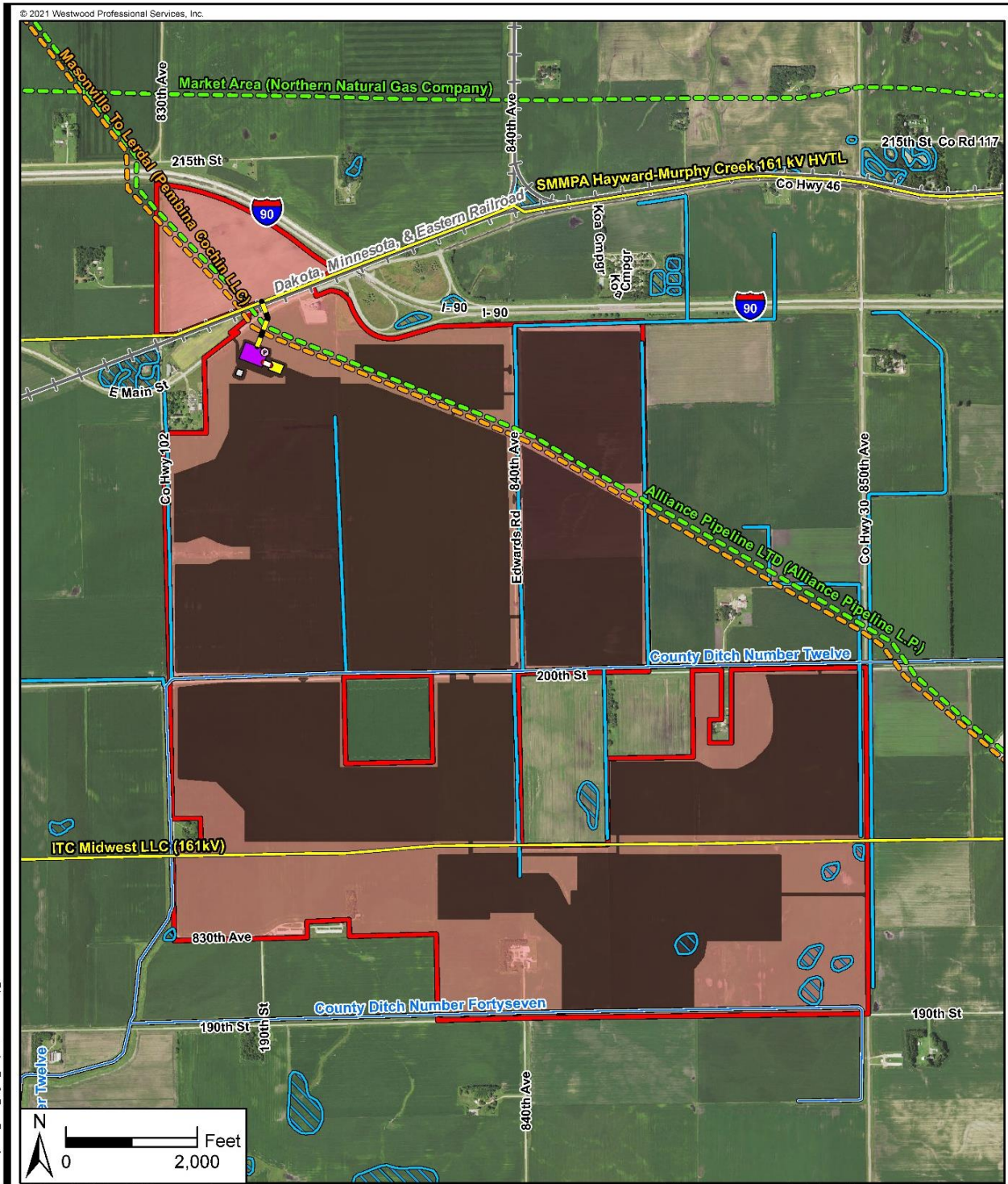


Figure 1: Project Location Map



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- Legend**
- Project Area
  - Preliminary Development Area
  - Current Land Control Area
  - Proposed Project O&M Building
  - Proposed Project Substation
  - SMMPA Switchyard
  - Railroad
  - POI
  - SMMPA Line Tap
  - Project Gen-Tie Line
  - Existing Transmission Line
  - Existing Natural Gas Pipeline
  - Existing Crude Oil Pipeline
  - Named NHD Flowline
  - NWI Wetland

## Hayward Solar Project

Freeborn County, Minnesota

### Project Overview

FIGURE 2

Figure 2: Project Overview Map

# Hayward Solar Project Site Overview & Conditions

## Introduction:

Arevon Energy, Inc. (Arevon) is a global leader and provider of comprehensive renewable energy infrastructure which oversees the development and marketing of energy projects. Arevon, on the behalf of Hayward Solar LLC, retained Tenaska, Inc., a national firm providing development support services for the Project, and Natural Resource Services, Inc. to prepare this Vegetation Management Plan (VMP) in coordination with Westwood Professional Services, Inc., a national engineering and environmental renewable energy consulting firm.

The VMP has been prepared to support the Site Permit Application (SPA) that will be filed with the Minnesota Public Utilities Commission (PUC) for Project approval. This VMP, in conjunction with the Project Agricultural Impact Mitigation Plan (AIMP), NPDES construction stormwater permit, Storm Water Pollution Prevention Plan (SWPPP), and related construction and operation design/engineering plans, work together to provide proper planning that will avoid, minimize and otherwise mitigate temporary and longer-term impacts. Information contained within the VMP is a combination of the experience of Natural Resource Services, Inc., along with consultation and reference of materials from the Minnesota Department of Natural Resources (MNDNR), the Minnesota Board of Water and Soil Resources (BWSR), and the *Guidance for Developing a Vegetation Establishment and Management Plan for Solar Facilities* (dated March 2021) provided by the Minnesota Department of Commerce (DOC), Division of Energy Resources – Energy Environmental Review and Analysis (EERA).

## Site Overview:

Economical production of clean renewable energy is the foremost goal of any solar site. There is a parallel opportunity to capitalize on the long-term, low maintenance aspects of native vegetation while providing critically important native habitat, grasses, sedges and wildflowers during operation of solar energy generation facilities. The principal vegetative goal of the Hayward Solar Project (Project) is to seed with all native species to create and maintain perennial, primarily native vegetation throughout the site that does not interfere with solar energy production/transmission and minimizes the amount of exotic invasive species found on site.

The secondary goal is to meet BWSRs' minimum standard for Habitat Friendly Solar and to create beneficial habitat (Appendix A; See also Minn. Stat. § 216B.1642). A minimum score of 70 is required on the Habitat Friendly Solar Site Assessment Form for Project Planning to qualify as Habitat Friendly. Following the site establishment period of three years, the site is reviewed by the vegetation management firm and scored again. The site must meet the minimum score of 70 on the Habitat Friendly Solar Site Assessment Form for Established Plantings to maintain status as a Pollinator Friendly Solar Site. Attaining and maintaining status as a Pollinator Friendly Solar Site would satisfy one of the requirements that would allow Hayward Solar to claim its site is providing beneficial habitat under Minn. Stat. § 216B.1642. This Established Habitat form can be found in Appendix B.

The use of single-axis tracking panels with a base edge of approximately 24-36" from the ground will allow for excellent diversity of native habitat while avoiding shading of the panels from plant growth. Maintenance is an important part of the success of native habitat on a solar site. This document includes a maintenance outline, timelines, and adaptive vegetation management strategies.



## Site Conditions:

The Project site's current land use is row crop farming (Figure 2). Prior to this use, the Project site would have been a combination of native wetland/marsh, wet prairie, and isolated pockets of mesic prairie, soils ranging between wet and dry as defined by the MNDNR. These plant communities and their historical ranges are used in the professional restoration community as a guide for native habitat restoration today. The seed mixes created for the Hayward Solar Project follow this same model.

The Project site is relatively flat agricultural land with drainage facilitated by field tiles and ditches (Figure 2). These agricultural tiles/ditches ultimately take water off site to the south and west. Several wetlands were delineated during the wetland survey conducted for the Project in 2020 in addition to the identified ditches (Figure 2). The delineated wetlands in the expected seeding areas appear to be primarily seasonal wetlands due to the extensive drain tile system throughout the Project site. There are existing grassland buffers along many of the drainage ditches. These buffer areas will be left undisturbed during construction and operation/maintenance of the Project and integrated into the vegetation management areas after planned seeding is complete. These buffer areas, in conjunction with adjacent roads, perennial streams, and drainage ditches provide an excellent barrier from nearby farmlands for much of the Project area, relative to other landowners' use of herbicides, pesticides and their associated drift. Despite these existing buffers, communication will still be made with adjacent landowners about minimizing adjacent herbicide and pesticide use and drift to comply with the Pollinator Scorecard requirements (Appendix A).

Soils found on the Project site as indicated by the Web Soil Survey via the U.S. Department of Agriculture (USDA), are primarily muck/silt/clay/loam soils and are categorized as poorly drained (Appendix C). The most prominent soil on site (>40%) is Klossner muck which is typically associated with organic marshes but because of the drainage tile on site, it does not retain water the way it normally would. The remaining soils are primarily of the poorly drained variety and would typically be associated with mesic to wet prairies and marshes, but because of existing drain tiles the soils are expected to be drier and more well drained than they would be in an undisturbed setting. This is shown by the fact that corn and beans have been grown on this site for years with little apparent flood or significant moisture damage seen in aerial photos. Seeding areas and seed mixes will be designed to match the conditions found on the Project site. A preliminary drainage and stormwater management analysis was completed for the Project and will be used with additional on-site soil and geotechnical data to be completed as Project design and engineering advances to determine final seed mixes. Additionally, the Agricultural Impact Mitigation Plan (AIMP) prepared for the Project includes plans for identifying, avoiding and repairing drain tile during construction and operation of the Project (AIMP, see Section 4.9). Therefore, Hayward Solar anticipates the current soil conditions to remain after construction. Hayward Solar will implement necessary actions and activities indicated in the AIMP during construction of the Project.

The planned reintroduction of native grasses, sedges, and forbs (wildflowers) suited to the soil conditions found at the Project site will provide several vital benefits including: 1) soil health will be improved as the soil 'rests' and the prairie matures; and 2) nutrients will be restored back into the soil and allow healthy microorganisms to flourish.

The native plant community will promote soil stabilization, reduce erosion and ultimately reduce the sediment load in nearby ditches and streams. The native habitat, in combination with planned installation of stormwater ponds, will reduce overland runoff by capturing stormwater on site and allow the extensive root systems of native plants to naturally filter it into the ground. Figure 3 displays the complex, expansive roots systems of native species compared to the shallow roots of turf grasses (located on graphic adjacent to the panel post).

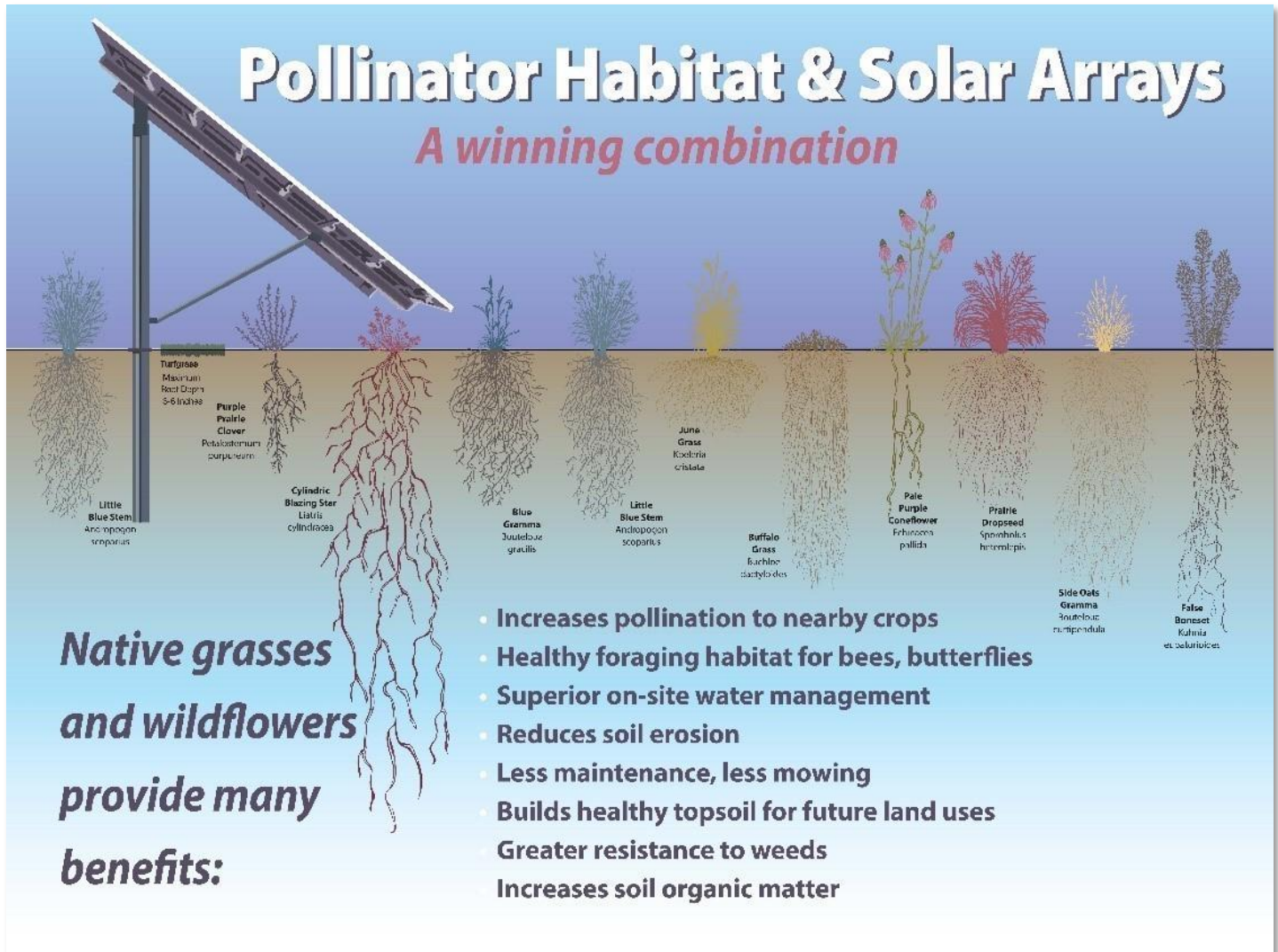


Figure 3: Deep root systems of native plant species. Source: Fresh Energy

Retaining stormwater on site, thereby reducing off site water flow, will reduce the influx of Phosphorus, Nitrogen, and other nutrients into the Shell Rock River Watershed (Figure 2). Unlike contemporary row crop farming, the planned native habitat will not require the application of any fertilizers throughout the life of the Project, further improving the quality of the water in the aquifer and watershed, including Albert Lea Lake.

The species specified in our recommended seed mixes are tolerant of the current and expected soil conditions found throughout the Project site and will provide critically needed habitat area for wildlife and native insects.

## **Invasive Species Prevention:**

Preventing new infestations of invasive species is important on any restoration site and solar sites are no different. The following guidelines, which are adapted from the MNDNR's "Come Clean, Leave Clean" philosophy<sup>1</sup> and the MNDNR's Operation Order 113<sup>2</sup>, shall be implemented by construction contractors associated with the Project and apply to all equipment and materials coming to and from the Project site:

1. Before arriving at or leaving the Project Site, inspect equipment and remove visible plants, seeds, mud, and dirt clods; and
2. While at the project site and moving to and from different areas, reasonable efforts should be made to remove visible plants, seeds, mud, and dirt clods; and
3. Construction materials imported to the Project site including any soil, erosion control products, and seed mixes shall be free of invasive species, if possible.

If new invasive species are found on the Project site, the appropriate maintenance/management personnel shall be notified. This VMP will be amended with the approved restoration industry response to the invasive species, e.g., physical removal and/or appropriate, limited herbicide use.

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<sup>1</sup> <https://www.dnr.state.mn.us/invasives/dnrlands.html>

<sup>2</sup> [https://files.dnr.state.mn.us/assistance/grants/habitat/heritage/oporder\\_113.pdf](https://files.dnr.state.mn.us/assistance/grants/habitat/heritage/oporder_113.pdf)

# Hayward Solar Seeding Overview and Maps

## Seeding Overview:

Native prairie and wetland species provide low maintenance vegetation that will not require fertilizer, amended soils or irrigation on the Project site. During construction, Hayward Solar will implement and follow the AIMP prepared for the Project to address soil compaction and decompaction (AIMP, see Sections 2.3, 3.2 and 4.2). Grasses, sedges and forbs have been selected based on their ecological appropriateness to the conditions of this site, are native to the region and chosen with consideration of their mature height to avoid interference with panel productivity. These mixes correspond with the MNDNR Native Plant Communities classification, and the BWSR pollinator habitat mixes found at these sites. <https://www.dnr.state.mn.us/npc/classification.html>  
<http://bwsr.state.mn.us/practices/pollinator/index.html>.

This seeding plan includes native grasses and sedges below the planned solar arrays and in between the rows. The Project areas outside of the planned perimeter fence, along with select areas inside the fence (including the constructed stormwater basins) will be seeded with grasses, sedges, and wildflowers to meet at least the minimum standards of the BWSR Habitat Planning Scorecard to qualify as pollinator friendly solar and beneficial habitat (referenced below)<sup>3</sup>. The exceptions are several building setback areas near existing homesteads that will act as distance buffers between the homes and the array and will not be seeded. These building setback areas will continue to be farmed.

For the Project site, all grasses and sedges used throughout the site will be low growing (<36" mature height) to ensure they do not interfere with solar energy production. Because the array area is seeded with only grasses and sedges, management/removal of any unwanted broadleaf plants is much easier than in a mixed prairie setting. Unwanted plants in the array would include non-native invasive plants or any plant whose height interferes with solar production. This allows us to increase diversity when creating the perimeter grass and forb mixes as they are planned for seeding outside of the array area. If any forbs migrate into the array areas and become a shading issue on the panels, they can easily be removed via appropriate management techniques (e.g., spot spraying with broadleaf specific herbicide). This is not expected to be a significant issue and all efforts will be made to minimize herbicide use. Native species tend to migrate slowly and only the native species that become a shading issue for solar production will be considered unwanted and treated as such.

The inclusion of some taller forbs outside the array areas will greatly increase the eligible species for the seed mixes, enhancing forb diversity and strengthening the pollinator forage capacity of the site while also allowing maximum solar energy generation capacity from the Project. A more diverse mix of forbs and grasses in the perimeter will provide natural screening of the array and will include flowering species across the spring, summer and fall.



Figure 4: Young Prairie in Solar Array

<sup>3</sup> See completed "Habitat Friendly Solar Site Assessment Form for Project Planning" document, Appendix A.



## Project Zones:

For area definition and description of acreage in the Project, this VMP is divided into 2 zones as shown in Figure 5 below. The North Zone is the area north of Township Road 121 / 200<sup>th</sup> Street. The South Zone is everything south of Township Road 121 / 200<sup>th</sup> Street. These zones were chosen based on natural breaks in the layout of the Project Area and to provide more detailed inspection of the Project Area in detail within this VMP.

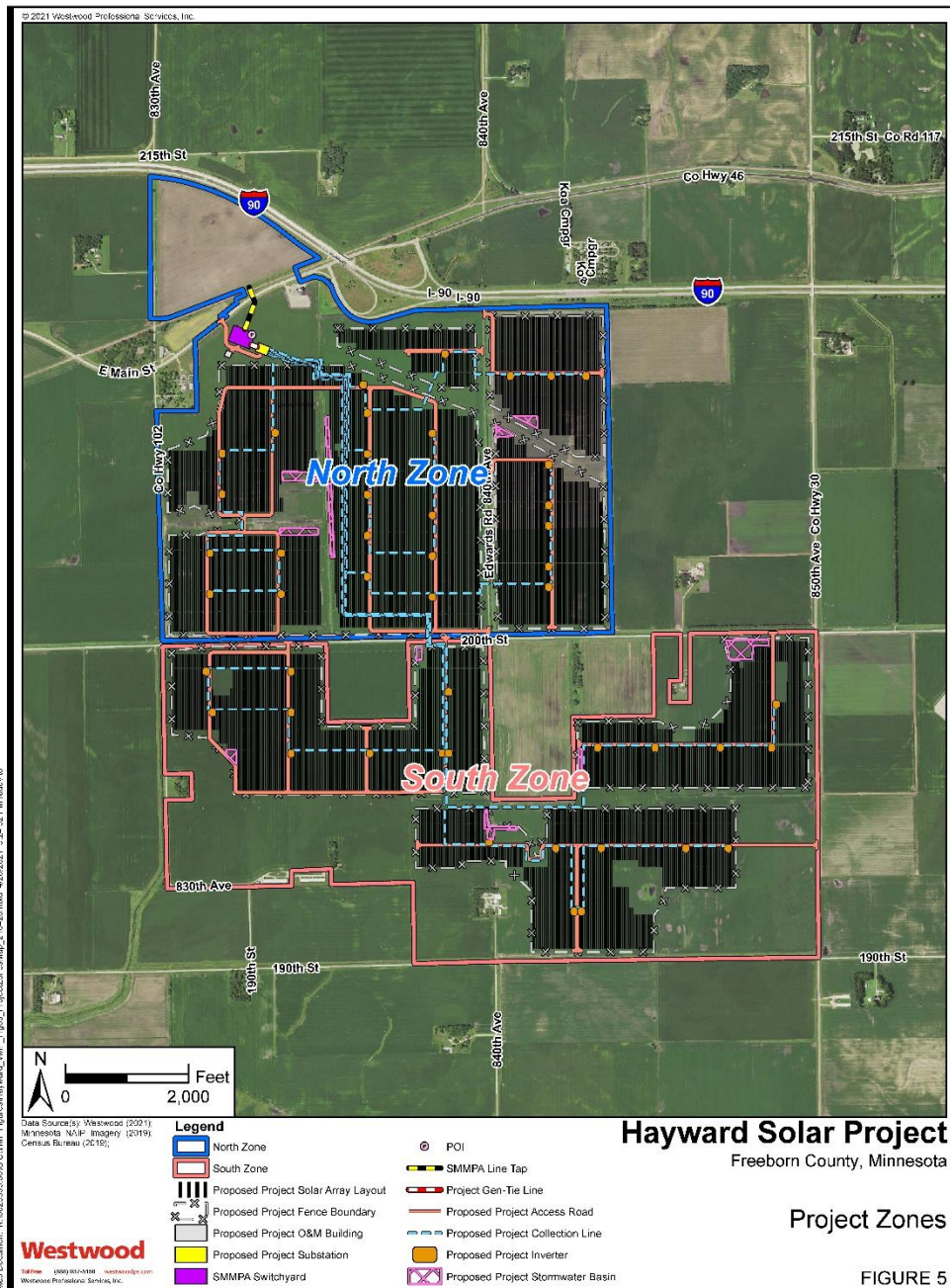


Figure 5: Project Zones Overview Map

## Seeding Area Breakdown and Maps:

The seeding areas found throughout both Project Area zones form two distinct categories.

The first is the perimeter area (outside the Project fence) and is approximately 210 acres – this total does not include the building setback areas which are anticipated to remain in agricultural production but does include some farmed delineated wetland areas. The entirety of the perimeter area will be seeded with grasses, sedges and forbs and includes both upland and wetland areas as shown in Table 1 Project VMP Seeding Plan Summary and Figures 6-8.

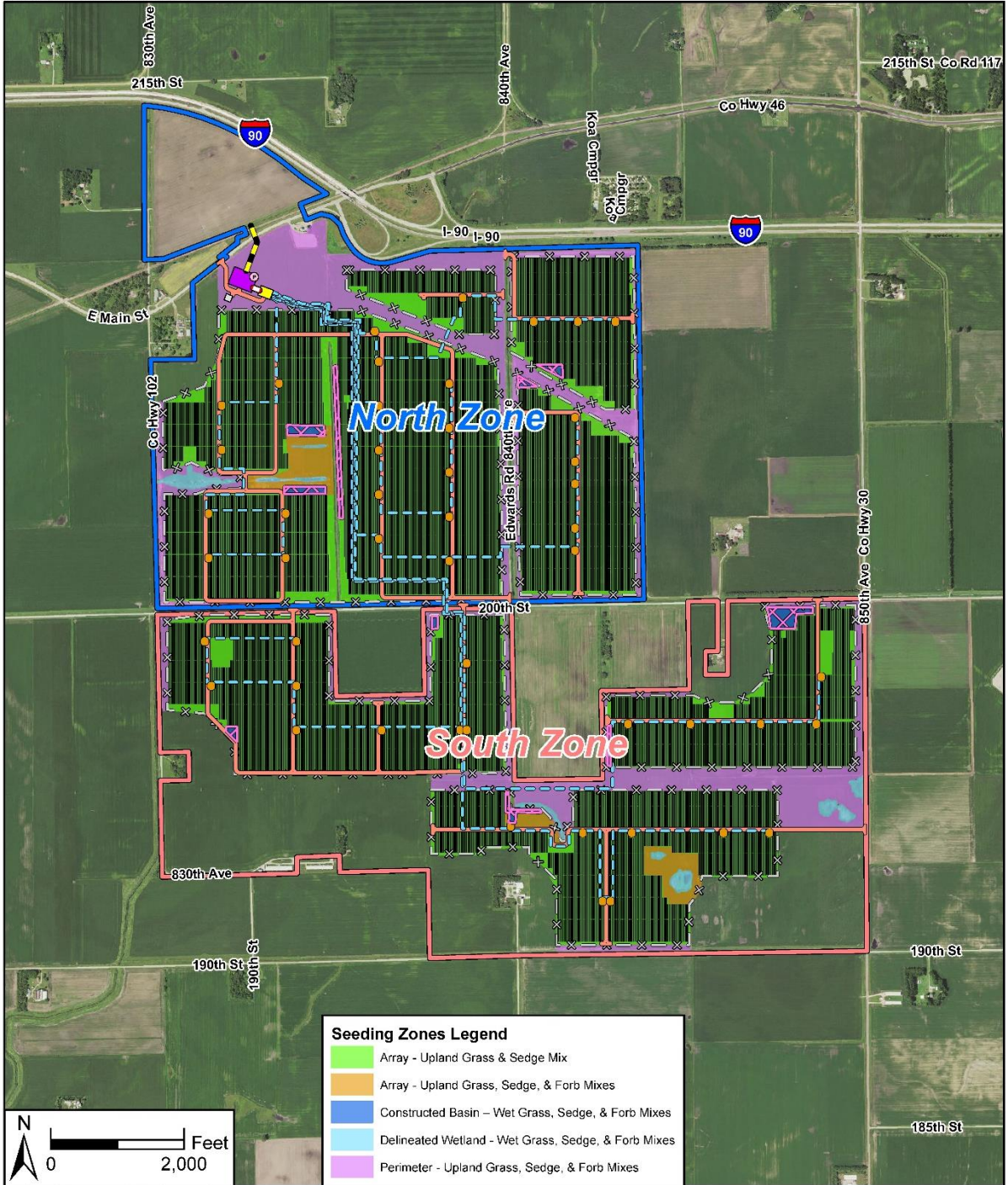
The second category includes land inside of the Project security fence (Array Area). Specific areas inside of the fence have been chosen for pollinator friendly habitat seeding, a mix of native grasses and forbs. The remainder will be seeded with grasses and sedges only. The pollinator habitat areas include the constructed basins totaling 14.25 acres and select areas outside of panels and rows including several delineated wetlands and upland areas totaling approximately 35 acres. A breakdown of these categories by zone is found in Table 1 and is shown in Figures 6-8 on the following pages.

Table 1 Project VMP Seeding Plan Summary

<b>Acreage Breakdown</b>	<b>North Zone</b>	<b>South Zone</b>	<b>Total</b>
Perimeter Wetland with forbs	3.26	3.65	<b>6.91</b>
Perimeter Upland with forbs	106.05	96.78	<b>202.83</b>
<b>Perimeter Total</b>	<b>109.31</b>	<b>100.43</b>	<b>209.74</b>
Array Upland - Grass/Sedge Only	670.01	494.59	<b>1164.59</b>
Array Constructed Basin with forbs	8.03	6.22	<b>14.25</b>
Array Wetland with forbs	2.52	2.06	<b>4.58</b>
Array Upland with forbs	13.93	16.94	<b>30.87</b>
<b>Array Total</b>	<b>694.49</b>	<b>519.81</b>	<b>1214.29</b>
Total Acreage with forbs	133.79	125.65	<b>259.44</b>
Total Acreage Grass/Sedge Only	670.01	494.59	<b>1164.60</b>
Total Seeding Acreage	803.80	620.23	<b>1424.03</b>

This results in a total of 259 acres of seeding with the pollinator habitat mixes which is approximately 18% of the estimated 1,424 total acres that will be seeded in the Project development area. The remaining 534 acres of Project area not included in the seeding area include existing grass buffer strips, roads, existing ditches/streams, the building setback areas, areas to remain in agriculture, and the solar facilities structures required to operate the solar array.





**Seeding Zones Legend**

- Array - Upland Grass & Sedge Mix
- Array - Upland Grass, Sedge, & Forb Mixes
- Constructed Basin - Wet Grass, Sedge, & Forb Mixes
- Delineated Wetland - Wet Grass, Sedge, & Forb Mixes
- Perimeter - Upland Grass, Sedge, & Forb Mixes

**Legend**

- North Zone
- South Zone
- Proposed Project Solar Array Layout
- Proposed Project Fence Boundary
- Proposed Project O&M Building
- Proposed Project Substation
- SMMPA Switchyard
- POI
- SMMPA Line Tap
- Project Gen-Tie Line
- Proposed Project Access Road
- Proposed Project Collection Line
- Proposed Project Inverter
- Proposed Project Stormwater Basin

Data Source(s): Westwood (2021); Minnesota NAIP Imagery (2019); Census Bureau (2019);  
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 Map File: (2021) 817-9150 westwoodpsi.com  
 Westwood Professional Services, Inc.

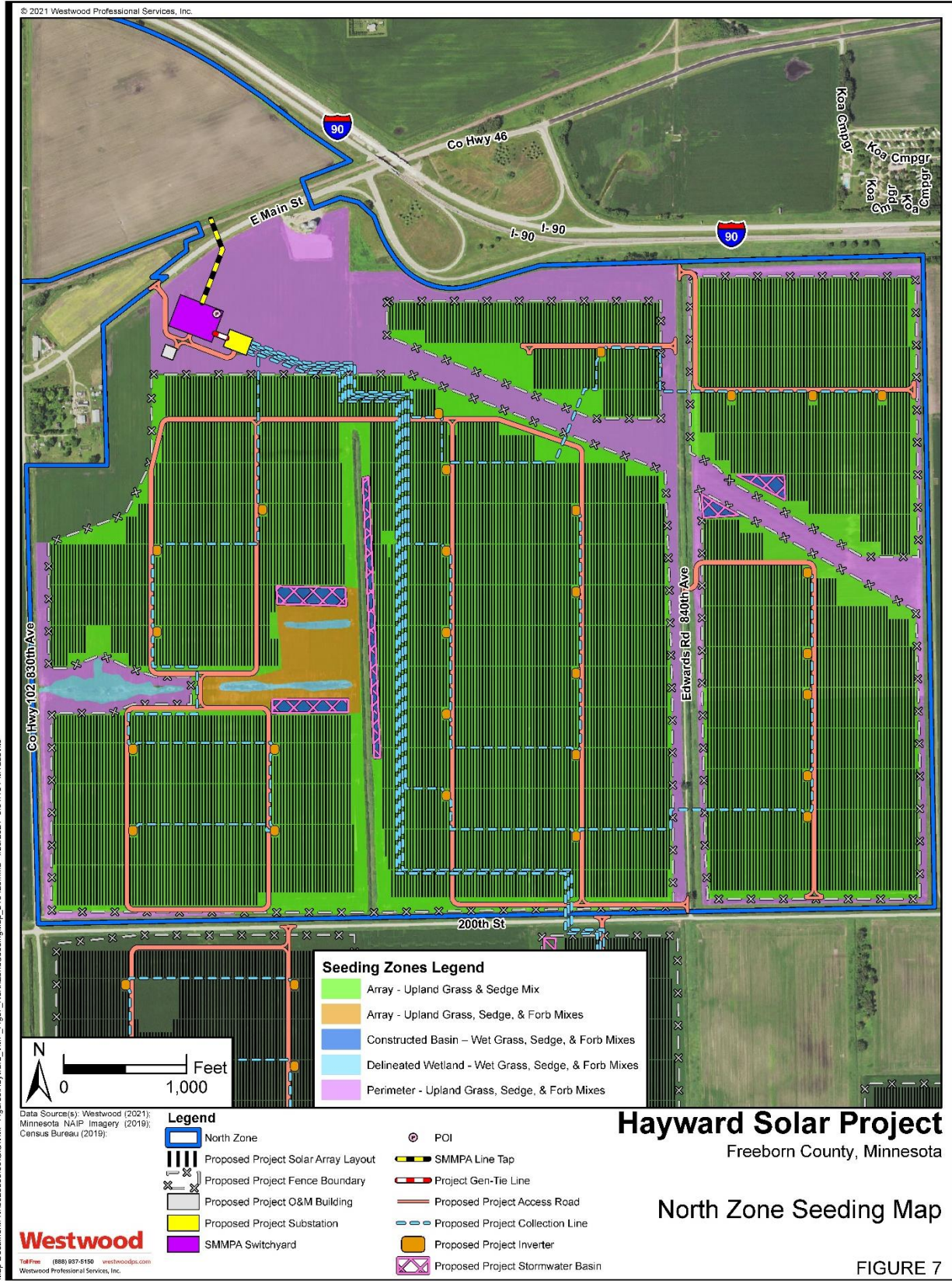
**Hayward Solar Project**  
 Freeborn County, Minnesota

**Seeding Zones Overview**

FIGURE 6

Figure 6: Seeding Zones Overview Map





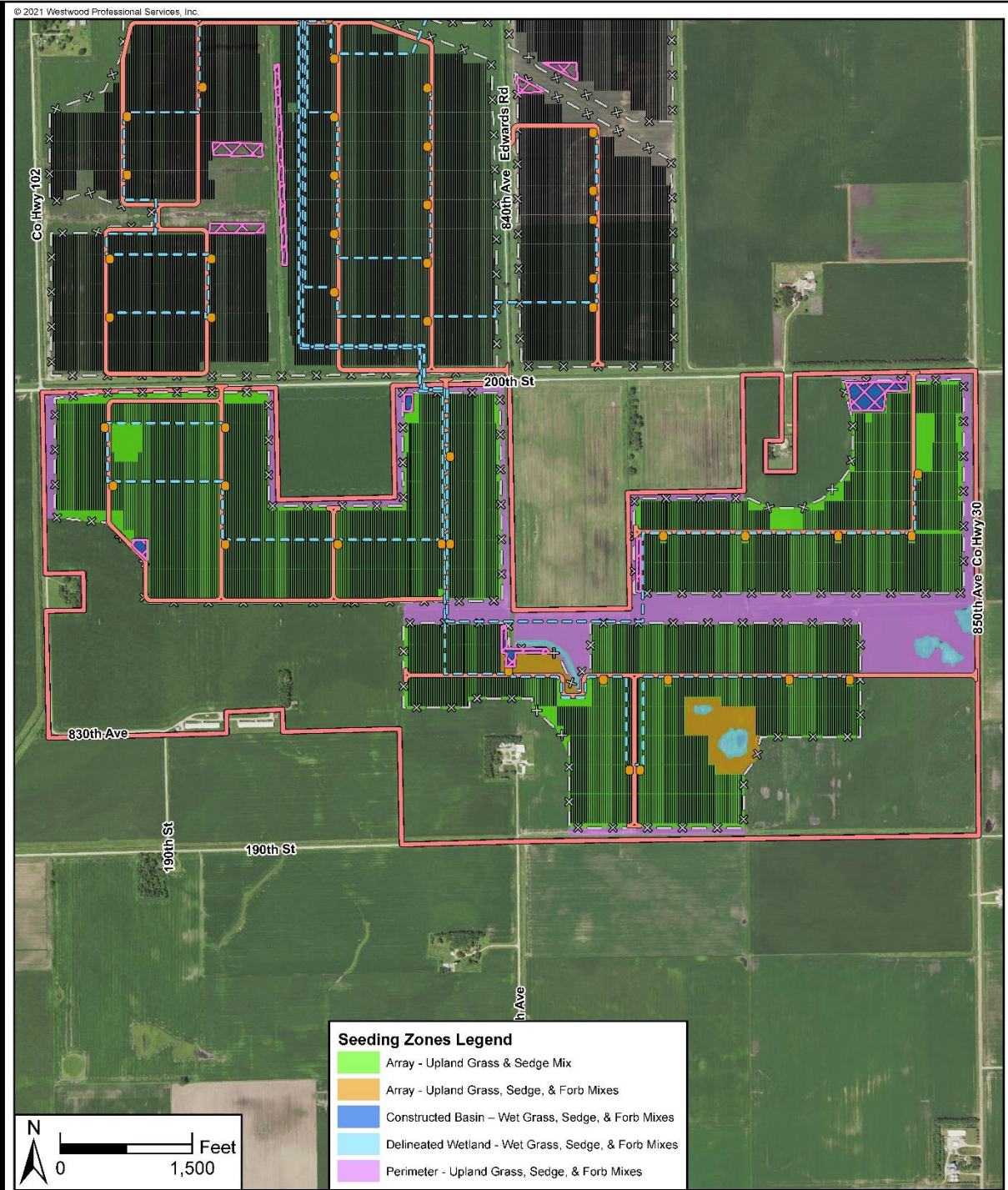
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Data Source(s): Westwood (2021); Minnesota NAIP Imagery (2019); Census Bureau (2019);  
**Westwood**  
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Figure 7: North Zone Seeding Map

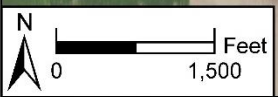


Map Document: N:\0205595.00\SIS\MAP\_Figures\Hayward\_VMP\_Fig08\_SouthZoneSeedingMap\_210426.mxd 4/28/2021 9:21:15 PM rabe/ro



**Seeding Zones Legend**

- Array - Upland Grass & Sedge Mix
- Array - Upland Grass, Sedge, & Forb Mixes
- Constructed Basin - Wet Grass, Sedge, & Forb Mixes
- Delineated Wetland - Wet Grass, Sedge, & Forb Mixes
- Perimeter - Upland Grass, Sedge, & Forb Mixes



Data Source(s): Westwood (2021); Minnesota NAIP Imagery (2019); Census Bureau (2019);

**Legend**

- South Zone
- Proposed Project Solar Array Layout
- Proposed Project Fence Boundary
- Proposed Project O&M Building
- Proposed Project Substation
- SMMPA Switchyard
- POI
- SMMPA Line Tap
- Project Gen-Tie Line
- Proposed Project Access Road
- Proposed Project Collection Line
- Proposed Project Inverter
- Proposed Project Stormwater Basin

## Hayward Solar Project

Freeborn County, Minnesota

### South Zone Seeding Map

FIGURE 8



Figure 8: South Zone Seeding Map

# Hayward Solar Seed Mixes

## Seed Mixes:

Grasses, sedges, and wildflowers provide long-term stability and structure to the landscape and help fill voids that would otherwise be ripe for weed invasion. Not insignificantly, grasses/sedges also provide excellent habitat for birds and nesting insects. Native wildflowers provide the critical forage of nectar and pollen for native insects including bees and butterflies as well as providing host plants for their egg laying.

It is important to note that the species we selected for this Project site are based on their ability to successfully establish from seed as well as their ability to 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 whole, have reasonable price points. Ultimately, the list is a combination of well-performing, workhorse species coupled with smaller amounts of more unique species for a robust mixture. However, the availability and pricing does change and adjustments to the seed mixes may be required when the Project begins construction and the site is ready for seeding.

When the native mixes are properly designed for site soil conditions and panel base heights, site owners see declining maintenance fees, one of the key benefits to choosing native habitat over turf grasses.

Based on the soil types and moisture conditions found on this Project site, the recommended mixes include the Upland Grass and Sedge Mix (Table 2 below), Upland Grass, Sedge and Forb Mix (Table 3 below), and the Wet Grass, Sedge and Forb Mix (Table 4 below).

The Upland Grass and Sedge Only mix will be seeded across the entire Project development area, excluding the stormwater basins, delineated wetlands and upland areas designated for forb seeding (1,165 acres – see Figures 6, 7 and 8 above). The Wet Grass, Sedge, and Forb mix will be seeded in the stormwater basins and delineated wetlands (25.75 acres – see Figures 6, 7 and 8 above). The Upland Grass, Sedge and Forb mix will be seeded in the perimeter seeding area and in the interior forb seeding areas not made up of delineated wetlands or stormwater basins (233.7 acres – see Figures 6-8 above). The scale of the Hayward Solar Project site drives the need for early commitment to securing of seed. A minimum of one year is recommended to assure adequate supply is available at reasonable pricing.



*Figure 9: Monarch butterfly visiting native habitat at Solar Array.*

Table 2 Upland Grass and Sedge Only Seed Mix

## Upland Grass and Sedge Only Mix

<b>Common Name</b>	<b>Scientific Name</b>	<b>Mix %</b>	<b>PLS Lbs/Acre</b>	<b>Seeds/Sq Ft</b>	<b>% of Seeds/Sq Ft</b>
Little bluestem	Schizachyrium scoparium	45.00%	3.6	19.83	31.7%
Side oats	Bouteloua curtipendula	35.00%	2.8	6.17	9.9%
Kalm's brome	Bromus kalmii	3.00%	0.24	15.28	24.4%
Fowl bluegrass	Poa palustris	4.00%	0.32	0.71	1.1%
Blue grama	Bouteloua gracilis	3.00%	0.24	3.53	5.6%
Plains oval	Carex brevior	3.00%	0.24	2.56	4.1%
Fox sedge	Carex vulpinoidea	3.00%	0.24	8.82	14.1%
Bebb's sedge	Carex bebbii	1.50%	0.12	1.50	2.4%
Pointed broom sedge	Carex scoparia	1.50%	0.12	3.70	5.9%
Prairie dropseed	Sporobolus heterolepis	1.00%	0.08	0.47	0.8%
<b>Mix Total Per Acre</b>		<b>100.00%</b>	<b>8</b>	<b>62.56</b>	

Table 3 Upland Grass, Sedge and Forb Seed Mix

## Upland Grass, Sedge and Forb Mix

Common Name	Scientific Name	Mix %	PLS		% of Seeds/Sq Ft
			Lbs/Acre	Seeds/Sq Ft	
Purple prairie clover	Dalea purpurea	6.00%	0.54	2.98	3.6%
White prairie clover	Dalea candida	4.33%	0.39	2.72	3.3%
Black-eyed Susan	Rudbeckia hirta	2.67%	0.24	8.11	9.9%
Hoary vervain	Verbena stricta	2.67%	0.24	2.47	3.0%
Golden alexander	Zizia aurea	2.00%	0.18	0.73	0.9%
Milk vetch	Astragalus canadensis	1.67%	0.15	0.94	1.1%
Leadplant	Amorpha canescens	1.67%	0.15	0.88	1.1%
Partridge pea	Chamaecrista fasciculata	1.67%	0.15	0.15	0.2%
Tall blazing star	Liatris pycnostachya	1.67%	0.15	0.61	0.7%
Common ox-eye	Heliopsis helianthoides	1.33%	0.12	0.28	0.3%
Yellow coneflower	Ratibida pinnata	1.00%	0.09	0.99	1.2%
Common milkweed	Asclepias syriaca	0.67%	0.06	0.09	0.1%
Butterfly weed	Asclepias tuberosa	0.67%	0.06	0.09	0.1%
Wild indigo	Baptisia alba	0.67%	0.06	0.04	0.0%
Stiff goldenrod	Solidago rigida	0.67%	0.06	0.90	1.1%
Blue vervain	Verbena hastata	0.67%	0.06	2.05	2.5%
Fragrant giant hyssop	Agastache foeniculum	0.50%	0.045	1.49	1.8%
Wild bergamot	Monarda fistulosa	0.50%	0.045	1.16	1.4%
Smooth aster	Symphyotrichum laeve	0.50%	0.045	0.91	1.1%
Yarrow	Achillea millefolium	0.33%	0.03	1.93	2.4%
Meadow blazing star	Liatris ligulistylis	0.33%	0.03	0.11	0.1%
Mountain mint	Pycnanthemum virginianum	0.33%	0.03	2.42	3.0%
Meadow rose	Rosa blanda	0.33%	0.03	0.03	0.0%
Calico aster	Symphyotrichum lateriflorum	0.33%	0.03	2.75	3.4%
Canada anemone	Anemone canadensis	0.17%	0.015	0.04	0.1%
<b>Forb Totals</b>		<b>33.33%</b>	<b>3</b>	<b>34.86</b>	<b>42.6%</b>
Little bluestem	Schizachyrium scoparium	30.00%	2.7	14.88	18.2%
Side oats	Bouteloua curtipendula	23.33%	2.1	4.63	5.7%
Fowl bluegrass	Poa palustris	2.67%	0.24	11.46	14.0%
Blue grama	Bouteloua gracilis	2.00%	0.18	2.64	3.2%
Kalm's brome	Bromus kalmii	2.00%	0.18	0.53	0.6%
Plains oval	Carex brevior	2.00%	0.18	1.92	2.3%
Fox sedge	Carex vulpinoidea	2.00%	0.18	6.61	8.1%
Bebb's sedge	Carex bebbii	1.00%	0.09	1.12	1.4%
Pointed broom sedge	Carex scoparia	1.00%	0.09	2.78	3.4%
Prairie dropseed	Sporobolus heterolepis	0.67%	0.06	0.35	0.4%
<b>Grass/Sedge Totals</b>		<b>66.67%</b>	<b>6</b>	<b>46.92</b>	<b>57.4%</b>
<b>Mix Total Per Acre</b>		<b>100.00%</b>	<b>9</b>	<b>81.78</b>	



Table 4 Wet Grass and Forb Seed Mix

## Wet Grass and Forb Mix

Common Name	Scientific Name	Mix %	PLS Lbs/Acre	Seeds/Sq Ft	% of Seeds/Sq Ft
Swamp milkweed	Asclepias incarnata	3.60%	0.225	0.40	0.3%
Tall blazing star	Liatris pycnostachya	2.52%	0.1575	0.64	0.5%
White prairie clover	Dalea candida	2.16%	0.135	0.94	0.7%
Purple prairie clover	Dalea purpurea	2.16%	0.135	0.74	0.6%
Black-eyed Susan	Rudbeckia hirta	2.16%	0.135	4.56	3.5%
Golden alexander	Zizia aurea	2.16%	0.135	0.55	0.4%
Common milkweed	Asclepias syriaca	1.80%	0.1125	0.17	0.1%
Joe-pye weed	Eutrochium maculatum	1.80%	0.1125	3.93	3.0%
Sneezeweed	Helenium autumnale	1.80%	0.1125	5.37	4.1%
Blue flag iris	Iris versicolor	1.80%	0.1125	0.05	0.0%
Water plantain	Alisma subcordatum	1.44%	0.09	1.98	1.5%
Canada tick trefoil	Desmodium canadense	1.44%	0.09	0.18	0.1%
Common ox-eye	Heliopsis helianthoides	1.44%	0.09	0.21	0.2%
Boneset	Eutrochium purpureum	1.08%	0.0675	3.97	3.0%
Creamy gentian	Gentiana alba (flavida)	1.08%	0.0675	3.47	2.6%
Sweet flag	Acorus americanus	0.72%	0.045	0.11	0.1%
Fragrant giant hyssop	Agastache foeniculum	0.72%	0.045	1.49	1.1%
Great blue lobelia	Lobelia siphilitica	0.72%	0.045	8.26	6.3%
Arrowhead	Sagittaria latifolia	0.72%	0.045	1.01	0.8%
Bur reed	Sparganium eurycarpum	0.72%	0.045	0.00	0.0%
Tall meadow rue	Thalictrum dasycarpum	0.72%	0.045	0.18	0.1%
New England aster	Symphotrichum novae-angliae	0.54%	0.03375	0.82	0.6%
Red-stalked aster	Symphotrichum puniceum	0.54%	0.03375	0.99	0.8%
Canada anemone	Anemone canadensis	0.36%	0.0225	0.07	0.1%
Monkey flower	Mimulus ringens	0.36%	0.0225	19.01	14.4%
Wild bergamot	Monarda fistulosa	0.36%	0.0225	0.58	0.4%
Mountain mint	Pycnanthemum virginianum	0.36%	0.0225	1.82	1.4%
Meadow rose	Rosa blanda	0.36%	0.0225	0.02	0.0%
Calico aster	Symphotrichum lateriflorum	0.36%	0.0225	2.07	1.6%
<b>Forb Totals</b>		<b>36.00%</b>	<b>2.25</b>	<b>63.58</b>	<b>48.3%</b>
Little bluestem	Schizachyrium scoparium	19.20%	1.2	6.61	5.0%
Side oats	Bouteloua curtipendula	7.68%	0.48	1.06	0.8%
Bottlebrush sedge	Carex comosa	6.40%	0.4	4.41	3.3%
Fox sedge	Carex vulpinoidea	6.40%	0.4	14.69	11.2%
Fowl bluegrass	Poa palustris	6.40%	0.4	19.10	14.5%
Kalm's brome	Bromus kalmii	4.32%	0.27	0.79	0.6%
Fringed brome-purchased	Bromus ciliatus	3.84%	0.24	0.88	0.7%
Bebb's sedge	Carex bebbii	1.92%	0.12	1.50	1.1%
Pointed broom sedge	Carex scoparia	1.92%	0.12	3.70	2.8%
Sprengel's sedge	Carex sprengelii	1.92%	0.12	0.44	0.3%
Stalk grained sedge	Carex stipata	1.92%	0.12	1.76	1.3%
Soft-stem bulrush	Schoenoplectus tabernaemontani	1.92%	0.12	1.37	1.0%
Dudley's rush	Juncus dudleyii	0.16%	0.01	11.75	8.9%
<b>Grass/Sedge Totals</b>		<b>64.00%</b>	<b>4.00</b>	<b>68.06</b>	<b>51.7%</b>
<b>Mix Total Per Acre</b>		<b>100.00%</b>	<b>6.25</b>	<b>131.64</b>	

## Hayward Solar Project Vegetation Installation Procedures

This section describes appropriate procedures for Project site preparation, soil preparation, and seeding techniques for installing native plant seed on a site of this size and with the expected site conditions. These procedures are based on years of experience both planning and installing native plant communities by Natural Resources Services, Inc. and its employees.

### Site Preparation for Vegetative Cover:

1. A cover crop can be seeded prior to the start of construction to provide soil stabilization, comply with applicable Agriculture Impact Mitigation Plan (AIMP), construction stormwater discharge permitting and SWPPP and regulations, and to help prevent muddy conditions during construction. Spring wheat or oats are typically used during the spring and summer, whereas winter wheat is used in the fall. Grading of the Project development area will be completed prior to seeding or soil preparation activities being completed (grading to be completed by owner or general contractor/construction contractor).
2. Soil compaction should be prevented and/or mitigated as appropriate and comply with the Project AIMP, construction stormwater permit, and SWPPP requirements. Section 2.3 of the Project AIMP provide details on steps to be implemented to prevent, avoid, minimize and mitigate soil compaction during construction and site restoration activities (e.g., site clearing and vegetation removal, earthwork, access road construction, array construction, electrical collection system installation, inverter installation, Project substation construction, collector line construction, stormwater drainage basin construction, fencing installation, etc.). Section 4.2 of the AIMP provides details concerning soil segregation and decompaction during construction of the Project.
3. Construction debris, garbage and building materials will be removed and/or staged outside the intended seeding areas (to be completed by owner or general contractor/construction contractor).
4. An herbicide application will be completed using glyphosate (Round-up® or equivalent) as per manufacturer's directions in areas with undesirable vegetation growing. Allow a minimum of 10 days before disturbing the soil or completing seeding activities. In wetland and basin areas an aquatically approved (by US EPA as per label) substitute shall be used.
5. When 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.
6. All herbicides will be applied according to manufacturer's directions by licensed herbicide applicators utilizing appropriate ground-based application equipment under acceptable weather and site conditions to minimize any aerial drift or overland movement of herbicide.

7. Depending on the Project construction schedule and vegetation growth, a mowing or second herbicide application may be necessary.
8. Disk soil within the Project development area in preparation for seeding.
9. Harrow or rake the soil to achieve the proper seedbed.

**Seeding by Vegetation Restoration Firm:**

1. Following the site preparation steps described above, all native seed will be applied using a mechanical broadcast spreader in a series of separate seeding passes.
2. A cover crop of annual oats or winter wheat, seasonally dependent, will be seeded at a rate of 20 lbs/acre with the native species. This cover crop or “nurse crop” aids in rapid green-up and soil stabilization.<sup>4</sup>
3. A final round of harrowing will be completed after the seeding of the native grasses and cover crop.
4. Lastly, the wildflower and sedge seed (where appropriate) will be broadcast onto the soil surface using a broadcast seeder.

*Figure 10: Tractor Broadcast Seeding*



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<sup>4</sup> See page 23 for MNDNR nurse crop recommendations  
[https://files.dnr.state.mn.us/assistance/nrplanning/community/trails\\_plantcommunities/chapter2.pdf](https://files.dnr.state.mn.us/assistance/nrplanning/community/trails_plantcommunities/chapter2.pdf)

## Hayward Solar Project Vegetation Maintenance:

This section provides an overview of the native vegetation maintenance and timelines for the Project. Maintenance of native habitat on a solar site plays a vital role in the eventual success of the vegetation, especially during the establishment period of the first three years following initial seeding.

The spring of the first full growing season following installation, the site will be inspected by the vegetation management company. This inspection is to determine if any reseeding or site repair is needed from activity on the site including snow and stormwater erosion. Hand grading and reseeding will take place in any areas indicating erosion. An NRS work report form (Appendix E) is supplied to site owner following each inspection.

In addition to the initial growing season spring visit by the contractor, the previous year's annual report will help to guide maintenance activities for the following year. This is referred to as an "adaptive management" strategy, where on-site conditions dictate the management activities that are required. Spring inspections should be planned for the first three years of a site following initial installation. Inspections of Project habitat should be planned once annually during a growing season for the life of the array. This will assure the vegetation is thriving and will prophylactically avoid major weed or erosion issues from occurring.

Our American prairies have evolved to respond to the impact bison and other grazing herd animals provided; their massive numbers and group movement were a means to managing native grasses, opening spaces of sunshine for native wildflowers and limiting biomass accumulation.

On natural prairies, the management tool of fire accomplished this maintenance much faster but was largely human initiated. As the tool of fire cannot be used to maintain installed vegetation at solar projects, flail mowers are used to chop the biomass into small particles, depositing it as fertilizer for the next growing season. This is done near the end of year five and then every three to five years from the initial mowing. This can spur seed germination and add growth of desirable shorter plants within the prairie while reducing biomass. In the event that flail mowing insufficiently reduces biomass at the Project site, Hayward Solar will identify and use an alternate management option. Spot herbicide treatments are a modern tool in reducing non-natives so the prairie can naturally fill in and take over as designed.



The recommended maintenance timeline is as follows:

1. During the germination year, the Project development areas seeded in native habitat will be mowed to control annual weed development and to aid in the growth of the prairie seedlings by reducing shade competition and prevent weeds from setting seed. Optimum cutting height is typically 4 to 6 inches this first year. In the geographic location of the Project, typically 2-4 mowings may need to be completed depending on time of seeding and growing conditions at the Project site. The mowing will be done using a flail mower or similar, finely mulching the clippings to prevent smothering of young plants.
2. In years two through four following the first full growing season Integrated Vegetation Management (IVM) services are utilized to control annual, biennial and perennial weed species within the developing native landscape. A weed for purposes of this project is any non-native invasive plant, any plant that interferes with the establishment of the planted seed mixes, or any plant that interferes with solar production. Typical IVM services include spot herbicide spraying and spot mowing. In general, mowing is used to control annual and biennial weeds that are presenting problems with prairie establishment whereas spot spraying is used on perennial weed species that are or have the potential to become problematic. These vegetation management procedures are advised by BWSR and MNDNR, to encourage growth of natives while minimizing the use of herbicides in controlling non-native weed species. The equipment commonly used on solar sites this size are small tractors and ATVs mounted with appropriate equipment.

# Hayward Solar Project Vegetation Timelines:

The following Project vegetation maintenance schedule will be implemented by Hayward Solar for a minimum of the first five full growing seasons, as outlined. Hayward Solar will identify and select a qualified restoration firm to conduct the seeding, establishment and maintenance phase tasks. After the third growing season, the BWSR Established Habit Scorecard, Appendix B, shall be completed and submitted to BWSR and site owner.

## Year                      Project Vegetation Maintenance Procedures

### Seeding Phase

- 2023 Prior to construction of Project, the site will be seeded with temporary cover crop such as oats or winter wheat at a rate of 25 lbs per acre, if needed, to stabilize site soil. Rates higher than this can create too much debris and be problematic when seeding the native mixes.
- 2023 Project construction will likely be completed on a rolling schedule. The selected restoration firm will confirm final soil conditions (hydric, wetland, mesic) as determined and noted in Appendix C of this Plan. Permanent seeding will follow installation of access roads, foundations, PV panels, final grading, and buried wiring as it is completed. Based on Project construction timing, seeding with native seed mixes plus a cover crop will likely begin in 2023 and be completed in 2024.

### Establishment Phase

- 2024 Following permanent seeding in 2023 and 2024, each newly seeded area will be inspected by the seed installer and an owner's representative 6-8 weeks later to determine acceptable germination rate and inspected for erosion; repair/reseed applicable areas as needed.

Two to four mowing trips may be necessary and will be determined by inspection of vegetation growth, local weather conditions and virulence of invasive species. The number and time of mowing applicable to Project site conditions will be determined and completed accordingly. Mowing during this stage of development is meant to keep the native seedlings from being shaded out and to keep weeds from seeding out and proliferating. Herbicide application is not recommended during the first or second growing seasons because prairie seedlings are still establishing and susceptible to inadvertent kill by herbicide use.

The first Project vegetation monitoring visit will be conducted, and an Annual Report (Appendix E) will be prepared. summarizing monitoring results. The Report will be submitted to site owner.

- 2025 Annual spring site inspection to check on the status and growth stage of the vegetation. Inspection results will be documented in a summary report. The spring inspection sets the stage for the yearly schedule for when management activities (mowing or specific spraying activities) would likely occur based on the general growth stage of the vegetation. This is not a detailed inspection, it is meant for the maintenance contractor to get a feel for when certain maintenance activities are likely to be needed.

Summer site review to include complete site mowing, timing based on local site conditions. Site review findings and mowing activities will be documents in a summary report.

Additional visits as needed to include IVM. Techniques utilized: Spot spraying, spot mowing, wicking, hand weeding and other methods used to control invasive species and weeds (3-4 complete site visits).

The second Project vegetation monitoring visit will be conducted, and an Annual Report will be prepared, summarizing monitoring results. The Report will be submitted to site owner.

#### 2026 Spring site inspection.

IVM as defined in 2022 above (3-4 complete site visits).

The third Project vegetation monitoring visit will be conducted, and an Annual Report will be prepared summarizing monitoring results. The Report will be submitted to site owner.

#### 2027 Spring/early summer site inspection.

IVM as defined in 2023 (2-3 complete site visits).

The fourth Project vegetation monitoring visit will be conducted, and an Annual Report will be prepared summarizing monitoring results. The Report will be submitted to site owner.

BWSR 3-year Established Planting scorecard (Appendix B) completed and submitted to BWSR and site owner.

#### 2028 1 Spring Dormant Mowing to mulch biomass.

IVM as defined in 2022 above (1 to 2 complete site visits).

The fifth Project vegetation monitoring visit will be conducted, and an Annual Report will be prepared summarizing monitoring results.

### **Maintenance Phase**

#### 2029-2059

Vegetation management during years 6-35 will include an annual site inspection followed by any necessary spot spraying or spot mowing, as needed (1 – 2 visits is typical, some years only an inspection is necessary). The vegetation management tool of a complete site mowing using flail mower may be used but not to exceed once per year, based on local site needs. Following inspection, a maintenance Report form, Appendix E, submitted to site owner. Every three years the report is submitted to BWSR.

Equipment used for site vegetation management includes zero turn mowers, tractor mounted flail mowers, brush cutters/weed whips and UTVs mounted with customized spray equipment.

## Hayward Solar Vegetation Monitoring and Reporting:

A Work Report (Appendix E) will be compiled following the annual site inspection and submitted to the site owner. After three full growing seasons, the BWSR scorecard for Established Habitat Plantings (Appendix B) will be completed and provided electronically to BWSR and Hayward Solar. The Work Report will include a summary of all management activities, inspections, site checks, and monitoring visits conducted on site during the applicable year. The Work Report will also outline any potential issues, corrective actions required and a schedule to implement corrective actions.

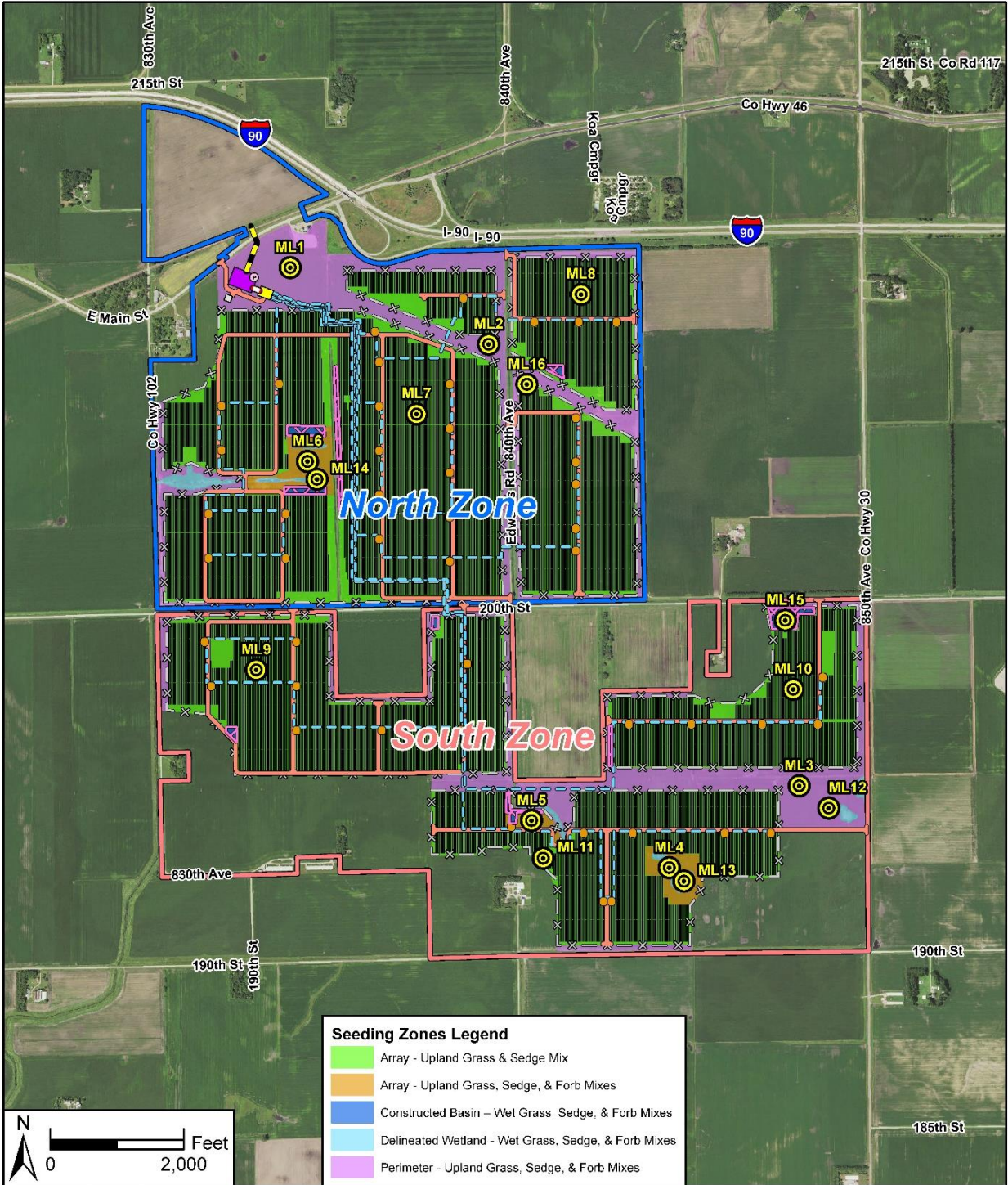
Additionally, once per year between June 15<sup>th</sup> and August 15<sup>th</sup> for the first five years, a vegetation monitoring visit will be conducted by an approved and qualified contractor. These visits will consist of the following activities:

- 1) Establish and map monitoring site areas, approximately one per every 100 acres with at least 5 locations in each of the different seed mix types as shown in Table 5.
- 2) Visit each pre-designated monitoring location shown on Figure 11, below, and record the percent vegetative cover of species present, both native and non-native. The vegetative cover shall be observed in a 10-foot radius of each of the monitoring locations.
- 3) Drive the perimeter of the Project site, inspecting for any noticeable vegetation issues within the Project Area and noting any non-native invasive species of concern adjacent to the Project Area.
- 4) Drive each of the access roads throughout the Project Area noting any issues, non-native species of concern, and potential corrective actions.

Table 5: Monitoring Site Locations

<b>Hayward Solar Monitoring Locations</b>				
<b>Monitoring Location ID</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Location Type</b>	<b>Seed Mix Used</b>
ML1	43°39'30.47"N	93°12'5.09"W	Perimeter	Upland Grass, Sedge, and Forb
ML2	43°39'18.85"N	93°11'24.83"W	Perimeter	Upland Grass, Sedge, and Forb
ML3	43°38'13.17"N	93°10'22.54"W	Perimeter	Upland Grass, Sedge, and Forb
ML4	43°38'1.30"N	93°10'49.13"W	Array Open	Upland Grass, Sedge, and Forb
ML5	43°38'8.45"N	93°11'17.07"W	Array Open	Upland Grass, Sedge, and Forb
ML6	43°39'1.82"N	93°12'1.93"W	Perimeter	Upland Grass, Sedge, and Forb
ML7	43°39'8.67"N	93°11'39.61"W	Array Aisle	Upland Grass and Sedge Only
ML8	43°39'26.11"N	93°11'5.94"W	Array Aisle	Upland Grass and Sedge Only
ML9	43°38'31.10"N	93°12'12.78"W	Array Aisle	Upland Grass and Sedge Only
ML10	43°38'27.42"N	93°10'23.53"W	Array Aisle	Upland Grass and Sedge Only
ML11	43°38'2.88"N	93°11'14.78"W	Array Open	Upland Grass and Sedge Only
ML12	43°38'9.84"N	93°10'16.57"W	Wetland	Wet Grass, Sedge, and Forb
ML13	43°37'59.26"N	93°10'46.18"W	Wetland	Wet Grass, Sedge, and Forb
ML14	43°38'59.17"N	93°12'0.04"W	Wetland	Wet Grass, Sedge, and Forb
ML15	43°38'37.64"N	93°10'25.00"W	Basin	Wet Grass, Sedge, and Forb
ML16	43°39'12.87"N	93°11'17.11"W	Basin	Wet Grass, Sedge, and Forb





Seeding Zones Legend	
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen;"></span>	Array - Upland Grass & Sedge Mix
<span style="display:inline-block; width:15px; height:15px; background-color:orange;"></span>	Array - Upland Grass, Sedge, & Forb Mixes
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Constructed Basin - Wet Grass, Sedge, & Forb Mixes
<span style="display:inline-block; width:15px; height:15px; background-color:lightcyan;"></span>	Delineated Wetland - Wet Grass, Sedge, & Forb Mixes
<span style="display:inline-block; width:15px; height:15px; background-color:lightpurple;"></span>	Perimeter - Upland Grass, Sedge, & Forb Mixes



Data Source(s): Westwood (2021); Minnesota NAIP Imagery (2019); Census Bureau (2019);



Legend			
<span style="display:inline-block; width:15px; height:15px; border:1px solid blue;"></span>	North Zone	<span style="display:inline-block; width:15px; height:15px; border:1px solid black; border-radius:50%;"></span>	Monitoring Location
<span style="display:inline-block; width:15px; height:15px; border:1px solid red;"></span>	South Zone	<span style="display:inline-block; width:15px; height:15px; border:1px solid black; border-radius:50%;"></span>	POI
<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	Proposed Project Solar Array Layout	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	SMMPA Line Tap
<span style="display:inline-block; width:15px; height:15px; border:1px dashed black;"></span>	Proposed Project Fence Boundary	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	Project Gen-Tie Line
<span style="display:inline-block; width:15px; height:15px; background-color:lightgrey;"></span>	Proposed Project O&M Building	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	Proposed Project Access Road
<span style="display:inline-block; width:15px; height:15px; background-color:yellow;"></span>	Proposed Project Substation	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	Proposed Project Collection Line
<span style="display:inline-block; width:15px; height:15px; background-color:purple;"></span>	SMMPA Switchyard	<span style="display:inline-block; width:15px; height:15px; border-bottom:1px dashed black;"></span>	Proposed Project Inverter
<span style="display:inline-block; width:15px; height:15px; border:1px dashed black;"></span>	Proposed Project Stormwater Basin		

# Hayward Solar Project

Freeborn County, Minnesota

## Monitoring Locations

FIGURE 11

Figure 11: Site map indicating 16 designated monitoring sites (yellow dots).

## Hayward Solar Project Habitat Friendly Site Assessment Form for Project Planning (Pollinator Scorecard)

The Project site was scored on the BWSR Habitat Friendly Scorecard (Appendix A) and is based upon the information in this VMP, Project plans, existing soil conditions per USDA information and expected construction and site preparation procedures prior to Project installation. Note: This Scorecard is often referred to within the industry by its original name “Pollinator Friendly Scorecard”.

Care was taken in the formulation of this VMP for future compliance with the BWSR Habitat Friendly standard in Minnesota when the Established Plantings Assessment is completed three years after Project (Appendix B). The goal is to maintain scores above 70 (the minimum at which a site is considered habitat friendly by the BWSR) at time of planning and throughout the life of the Project.

If vegetated as described in this Plan, the Hayward Solar Project will score a robust 88 points (Appendix A). This means it will provide diverse and critical habitat while producing clean, renewable electricity. The purpose of this BWSR Solar Site Assessment Scorecard is to provide a consistent standard by which habitat friendly solar sites can be measured, with the measurements and points scored relevant to habitat provided, native plant species included, and insecticides minimized.



*Figure 12: Solar vegetated with native habitat.*

## Resources:

<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

<https://www.dnr.state.mn.us/invasives/dnrlands.html>

<http://bwsr.state.mn.us/minnesota-habitat-friendly-solar-program>

<https://www.shootingstarnativeseed.com/>

<http://bwsr.state.mn.us/minnesota-habitat-friendly-solar-program>

<https://www.dnr.state.mn.us/npc/classification.html>

# Appendices



# Appendix A: BWSR Habitat Planning Scorecard



## Habitat Friendly Solar Site Assessment Form for Project Planning

For solar companies and local governments to meet Habitat Friendly standards  
5-26-2020

### 1) PLANNED % OF SITE DOMINATED BY NATIVE SPECIES COVER (wildflowers, grasses, sedges, shrubs, trees)

- 26-50% +5 points
- 51-75% +10 points
- 76% and above +15 points

Total points

### 2) PERCENT OF PROPOSED SITE VEGETATION COVER TO BE DOMINATED BY WILDFLOWERS (not grasses and sedges)

- 10-20 % +5 points
- 21-30 % +10 points
- 31% and above +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 based on seeds per square foot (from all seed mixes to be planted).*

### 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

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

- Spring (April - May) +10 points
- Summer (June - August) +5 points
- Fall (September - October) +5 points

Total points

See BWSR [Pollinator Toolbox](#) about bloom season.

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

- Native bunch grasses for nesting +3 points
- Native flowering shrubs +4 points
- Clean, perennial water sources +3 points
- Created nesting feature/s (bee blocks, etc.) +4 points

Total points

### 6) SITE PLANNING AND MANAGEMENT

- Detailed establishment and management plan (see notes) developed with funding/contract to implement. +15 points

- Signage legible at forty or more feet stating pollinator friendly solar habitat (see notes for number of signs). +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 of site (see notes). +8 points

- At least 1% 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 with local chemical applicators/neighbors about need to prevent drift from adjacent areas (see notes). +10 points

Total points

Grand Total

Gold Standard - Provides Exceptional Habitat 85+

Meets Pollinator Standards 70

Project Name: Hayward Solar  
 Vegetation Consultant: Natural Resource Services, Inc.  
 Project County: Freeborn  
 Project Size: 1,958 total project acres, 1,424 seeding acres  
 Projected Seeding Date: TBD 2022-2023

*See notes related to the question on the back side of this form.*



**Notes:**

Estimates of percent “cover” should be based on “absolute cover” (the percent of the ground surface that is covered by a vertical projection of foliage as viewed from above).

All project plans must include detailed vegetation establishment and management specifications to ensure the success of projects (see sample specifications on [BWSR's Habitat Friendly Solar Webpage](#)).

Seed mixes provided for projects need to show seeds per square foot for each species in the mix.

**Question 1** - Native plant species provide benefits to a wide range of pollinators and other wildlife species. The [Minnesota DNR List](#) should be used to determine if a species is native. Native species include wildflowers, graminoids (grasses, sedges, rushes), shrubs and trees. The percent areal cover of native vs. non-native species should be estimated based on the seeds per square foot of all species to be used across all seed mixes.

**Question 2** - There is a focus on wildflowers on this assessment form to maximize benefits to the approximately 450 species of native bees in Minnesota, honeybees and other pollinators. Wildflowers in question 2 refer to “forbs” (flowering plants that are not woody or graminoids such as grasses and sedges) and can include introduced clovers and other non-native species beneficial to pollinators. No noxious weeds or invasive plants can be included in the total.

**Question 3** - Plant diversity adds to wildlife benefits, as well as the resiliency of projects. For this question, planned native and non-native species from all seed mixes can be combined for the total. Species must be planned to be used in a seed mix that will cover at least two acres at the site to be used for the total.

**Question 4** - Having blooming species throughout the season helps support pollinator species. See [BWSR's Pollinator Toolbox](#) for a listing of bloom seasons for species.

**Question 5** - The planting of native bunch forming prairie grasses, as well as native flowering shrubs is promoted as part of projects to increase nesting opportunities. If bunch grasses are included as part of plantings it is important that they are not mowed below four inches as part of yearly maintenance to ensure that they are not damaged. Habitat components must be within sites or within .25 miles of the site for this question.

**Question 6 -**

To meet requirements for a long-term management plan projects must provide information about:

- Timing of yearly inspections,
- Evidence of funding and a contract for management for at least the first three years.
- A detailed native vegetation establishment plan with detailed instructions for contractors.
- A detailed maintenance schedule for the first three years of the project listing timing of establishment mowing/trimming, spot herbicide application, prescribed grazing or other management actions.
- Proposed maintenance schedule for year four and beyond.
- List of weed species that may become problematic at the site how they will be managed if needed.
- Maintenance needs for any constructed nest habitat for the project.

Visible signage can play an important role in communicating the multiple benefits of Habitat Friendly Solar. Signs must be legible at forty or more feet in locations where the public can view the signs and state that the project is a Habitat Friendly Solar project. At least one sign is recommended every 20 acres up to a maximum of 5 signs.

**Question 7** - All mixes being used for the project must include at least 40 seeds per square foot to receive points for the first category. Please refer to pages 7-8 of [BWSR's Native Vegetation Establishment and Enhancement Guidelines](#) for more information about appropriate seed sources. To obtain points for including milkweed in projects at least 1% must be in seed mixes based on seeds per square foot, or a combination of seed and containerized plugs could be used with a plan to cover 1% of the ground surface with milkweed.

**Question 8** - It is important that seeds treated with insecticides are not used at project sites and that insecticides are not being sprayed at the site. To meet requirements for communication/registration with local landowners/applicators about the need to prevent drift from adjacent areas, information provided can be in the form of email communication or copies of letters. Communication must be provided to all landowners adjacent to the property including municipalities.

Send completed forms, project plans, seed mixes (showing seeds per square foot for each species) and any communications with pesticide applicators to local government staff with decision making authority for the project or BWSR at [Paul.Erdmann@state.mn.us](mailto:Paul.Erdmann@state.mn.us) if local government staff are not involved in reviewing the project.

# Appendix B: BWSR Established Habitat Scorecard



## Habitat Friendly Solar Site Assessment Form for Established Plantings (after year 3)

For solar companies and local governments to meet Habitat Friendly Standards  
5-26-2020

**1) % OF SITE DOMINATED BY NATIVE SPECIES COVER  
(wildflowers, grasses, sedges, shrubs, trees)**

- 5-25% +5 points
- 26-50% +15 points
- 51-75% +20 points
- 76+ +25 points

Total points

**2) PERCENT OF SITE DOMINATED BY WILDFLOWERS  
(not grasses and sedges)**

- 5- 8 % +10 points
- 9-16 % +15 points
- 17-25 % +20 points
- 26-34 % +25 points
- 35+ +30 points

Total points

**3) COVER DIVERSITY (# of plant species with >1% cover)**

- 1-9 species +5 points
- 10-19 species +15 points
- 20-25 species +25 points
- 26 or more species +30 points

Total points

*Exclude invasive/noxious weeds from species totals.*

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

- Spring (April-May) +10 points
- Summer (June-August) +5 points
- Fall (September-October) +5 points

Total points

*See BWSR [Pollinator Toolbox](#) for Information about bloom season.*

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

- Native bunch grasses for nesting +3 points
- Native flowering shrubs +4 points
- Clean, perennial water sources +3 points

Total points

**6) AVAILABLE HABITAT COMPONENTS ON-SITE  
(check/add all that apply)**

- At least 1% milkweed cover +5 points
- Detailed management plan developed (see notes) with funding/contract to implement +15 points
- Signage legible at forty or more feet stating pollinator friendly solar habitat (see notes for sign numbers) +5 points
- Constructed and maintained nesting habitat feature/s (bee blocks, etc.) +5 points

Total points

**7) INSECTICIDE RISK**

- Planned on-site insecticide use. (excluding buildings/electrical boxes, etc.) -25 points
- Communication with local chemical applicators/neighbors about need to prevent drift from adjacent areas. +10 points

Total points

Grand Total

**Gold Standard - Provides Exceptional Habitat 85+  
Meets Pollinator Standards 70**

Project Name \_\_\_\_\_  
Vegetation Consultant: \_\_\_\_\_  
Project County: \_\_\_\_\_  
Project Size: \_\_\_\_\_  
Evaluation Date: \_\_\_\_\_

*See notes related to the questions on the back side of this form.*



**Notes:**

Estimates of percent “cover” should be based on “absolute cover” (the percent of the ground surface that is covered by a vertical projection of foliage as viewed from above).

To measure cover diversity use plots, and/or transects in addition to meander searches.

All project plans must include detailed vegetation establishment and management specifications (and detailed long-term management planning is encouraged) to ensure the success of projects (see sample specifications on [BWSR’s Habitat Friendly Solar Webpage](#)).

**Question 1** - The [Minnesota DNR List](#) should be used to determine if a species is native. Native species can include wildflowers, graminoids (grasses, sedges, rushes), shrubs and trees.

**Question 2** - Wildflowers in question 2 refer to “forbs” (flowering plants that are not woody or graminoids such as grasses and sedges) and can include introduced clovers and other non-native species (that are not noxious weeds or invasive species) beneficial to pollinators and located anywhere across the state.

**Question 3** - Plant diversity adds to wildlife benefits as well as the resiliency of projects. For this question native and non-native species (that are not noxious weeds or invasive species) that establish at the site and have greater than one percent cover can be combined for the total.

**Question 4** - See BWSR’s [Pollinator Toolbox](#) for a listing of bloom seasons for species. Non-native clovers can be counted as either spring or summer species but not both.

**Question 5** - The planting of native bunch forming prairie grasses, as well as native flowering shrubs promoted as part of projects to increase nesting opportunities. It is important that planted bunch grasses are not mowed lower than four inches as part of maintenance activities to prevent damaging them. Any of the habitat components must be within the state or .25 miles of the project for obtaining points.

**Question 6** - Estimates of milkweed percent cover should be based on milkweed present across the entire site.

To meet requirements for a long-term management plan projects must provide information about:

- Timing of yearly inspections.
- Evidence of funding and a contract for management for at least the first three years.
- A detailed native vegetation establishment plan with detailed instructions for contractors.
- Detailed maintenance schedule for the first three years of the project listing timing of establishment.
- Mowing/trimming, spot herbicide application, prescribed grazing or other management actions.
- Proposed maintenance schedule for years four and beyond.
- List of weed species that may become problematic at the site how they will be managed if needed.
- Maintenance needs for any constructed nest habitat for the project.

Visible signage can play an important role in communicating the multiple benefits of Habitat Friendly Solar. Signs must be legible at forty or more feet in locations where the public can view the signs and state that the project is a Habitat Friendly Solar project. At least one sign is required every 20 acres. up to a maximum of 5 signs.

**Question 7** - It is important that seeds treated with insecticides are not used at project sites, or that sites are not sprayed with insecticides. To meet requirements for communication/registration with local landowners/ applicators about the need to prevent drift from adjacent areas, information provided can be in the form of email communication or copies of letters. Communication must be provided to all landowners adjacent to the property including municipalities.

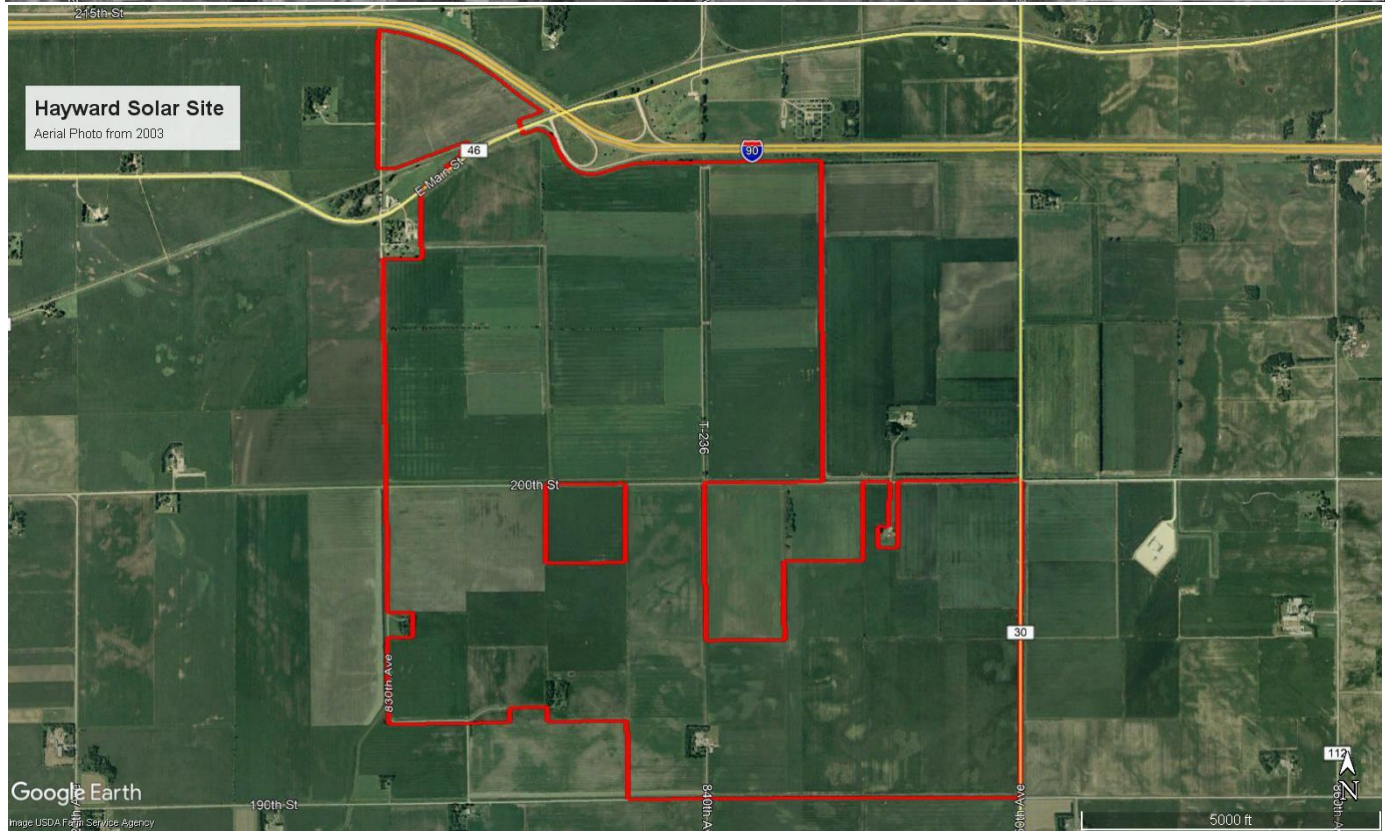
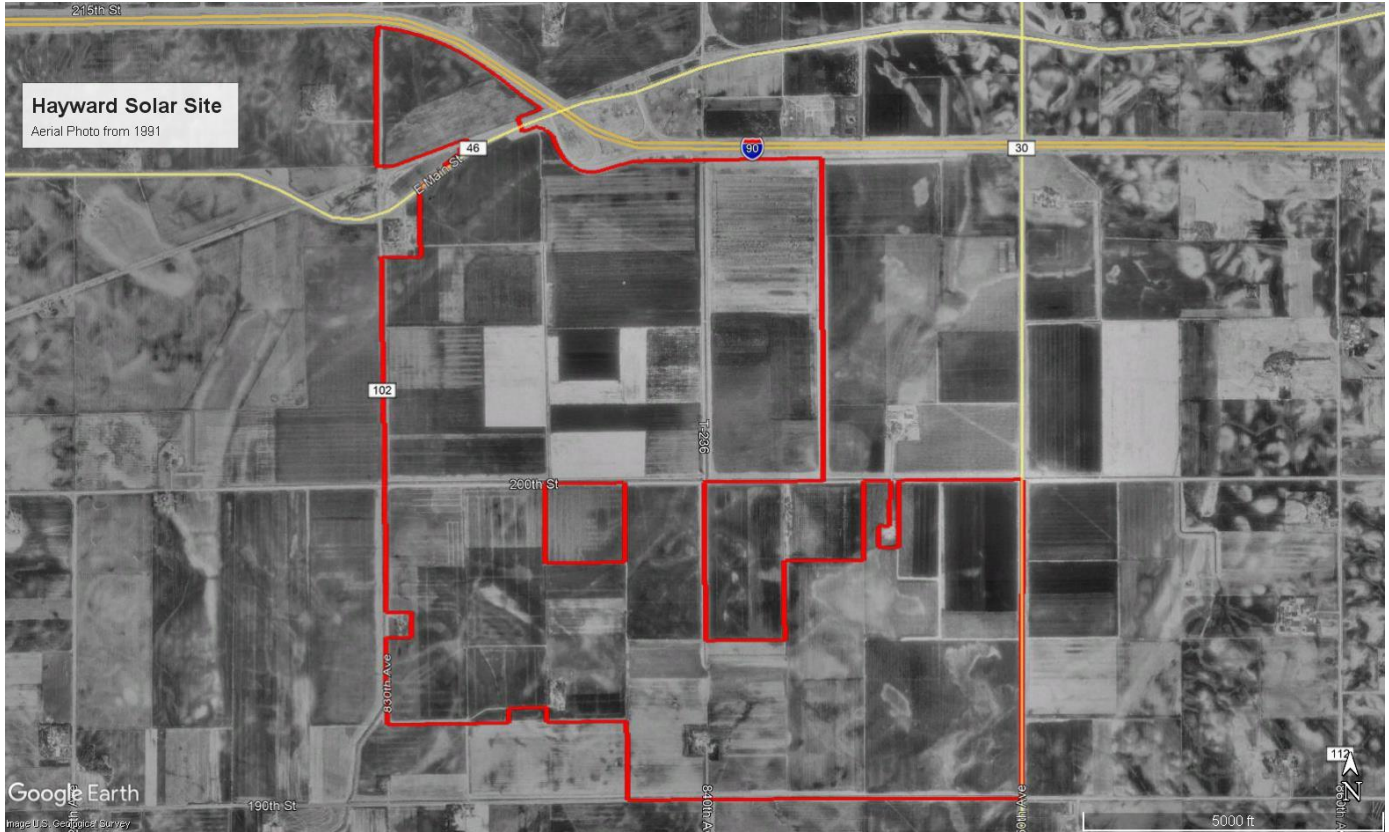
**Send completed forms, project plans, seed mixes (showing seeds per square foot for each species) and any communications** with pesticide applicators to local government staff with decision making authority for the project or BWSR at [paul.erdmann@state.mn.us](mailto:paul.erdmann@state.mn.us) if local government staff are not involved in reviewing the project.



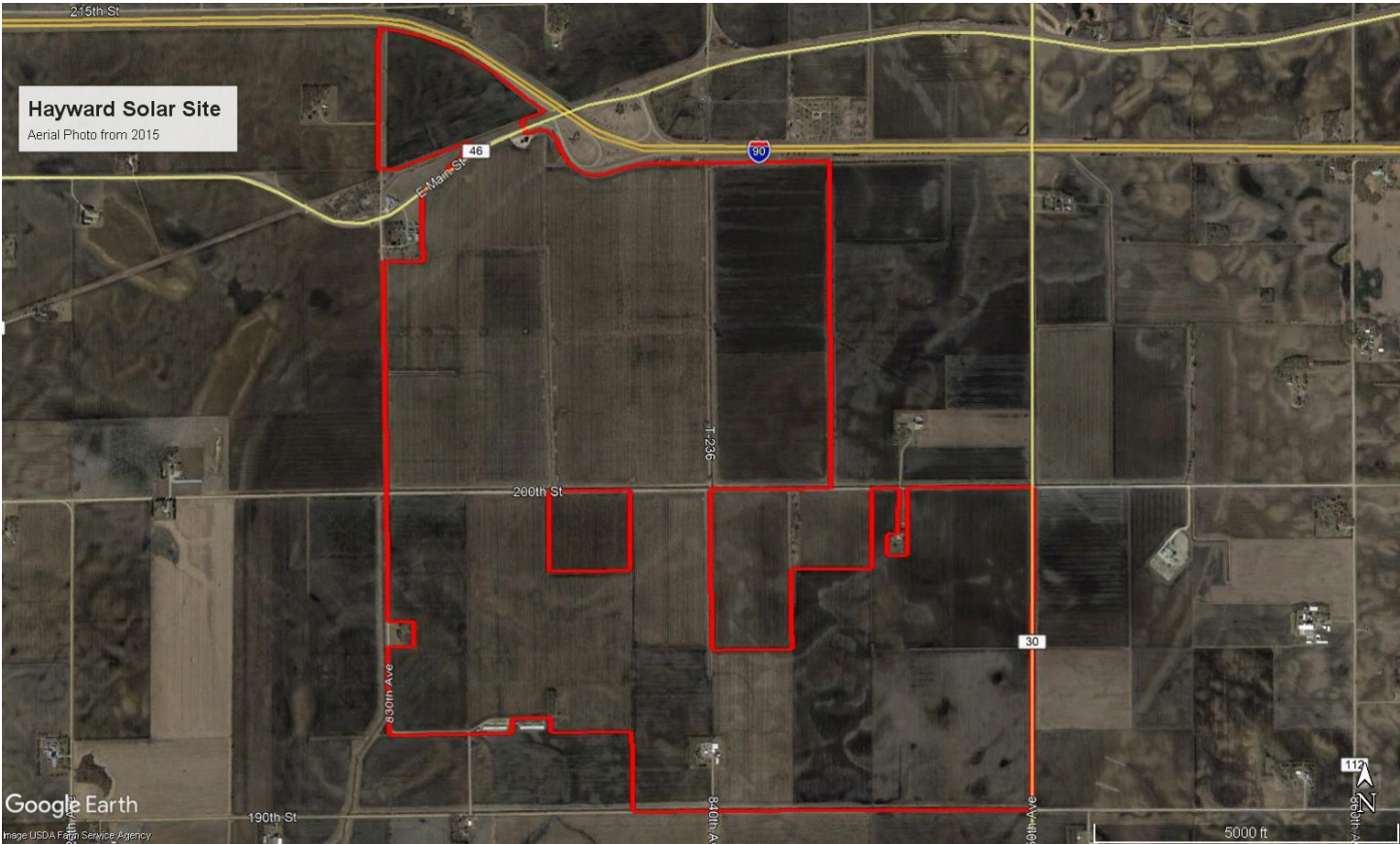
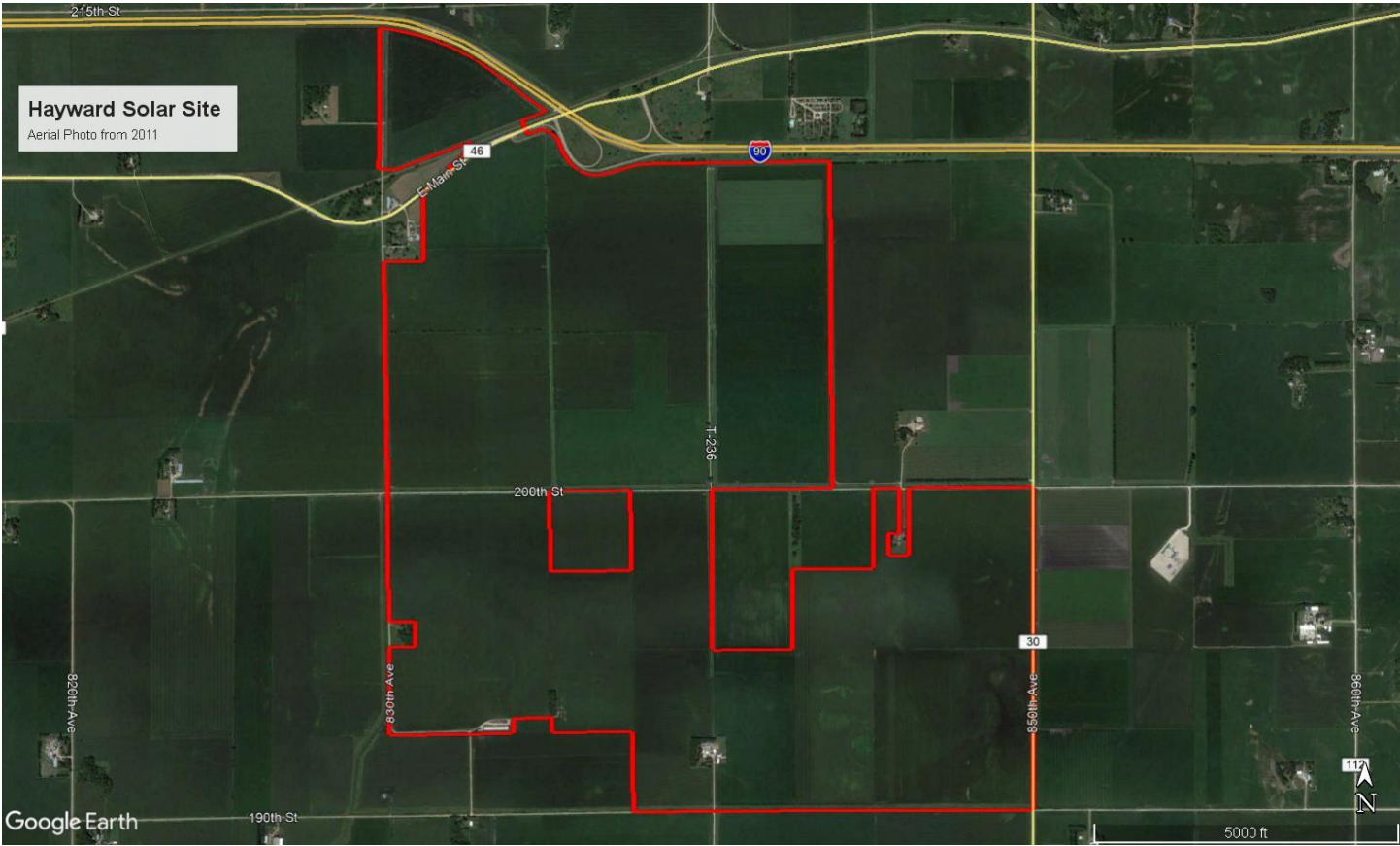




# Appendix D: Hayward Solar Historical Imagery Maps







# Appendix E: NRS Sample Work Report

## Natural Resource Services Work Report

Client: \_\_\_\_\_

Date: \_\_\_\_\_

Project: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Address: \_\_\_\_\_

### Scope of Work:

### Vegetation Status:

### Future Work Recommended? \_\_\_\_\_

### Comments:



