Appendix F

Preliminary Vegetation Management Plan

Vegetation and Soil Management Plan

Stantec Project No: 227706727

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VEGETATION AND SOIL MANAGEMENT PLAN
Northern Crescent Solar and Storage Project

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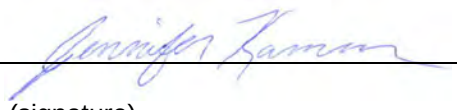
Reviewed by 

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Executive Summary

Northern Crescent Solar LLC (Northern Crescent Solar) is developing the Northern Crescent Solar and Storage Project (Project) in Faribault County, Minnesota (**Appendix A, Figure 1**). The Project has an expected generating capacity of up to 150 megawatts (MW) with an associated 50MW of battery energy storage system (BESS). The overall Project Area is approximately 1,179 acres; the preliminary development area (i.e., area within the overall Project area where Project facilities will be located) includes approximately 930 acres of solar arrays, inverters, underground collection line, battery storage, Project Substation, access roads, and an operation and maintenance facility (**Appendix A, Figure 2**). Northern Crescent Solar has developed a Vegetation and Soil Management Plan (VSMP) to guide vegetation management for the Project area from the pre-construction phase through post-construction operation.

The facility will operate under a Minnesota Public Utilities Commission (Commission or PUC) Site Permit under Docket IP-7096/GS-22-57. This VSMP was developed in accordance with EERA guidance and Minnesota Department of Natural Resources (MNDNR) guidelines. Consultation with the Minnesota Department of Commerce (DOC) Vegetation Management Plan Working Group (VMPWG) will need to occur to obtain their approval of this VSMP prior to construction. The VMP covers site preparation, installation of seed materials, management activities during the vegetation establishment and maintenance phases along with annual monitoring, and reporting.

Land use within the proposed Project area is primarily row-crop agricultural. Areas to be planted with perennial native vegetation include all fenced areas used for facility infrastructure including underneath and between panels, as well as areas between arrays and fence line borders, excluding access roads, stormwater basins, and related Project facilities. Perimeter areas outside of the fence that require permanent vegetative cover will also receive permanent perennial native vegetation.

The VSMP sets vegetation goals and provides management activities that will be used to achieve those goals in a manner that is consistent with regulatory standards while allowing for economic and operational feasibility. Northern Crescent Solar intends to establish and maintain vegetation on the site that meets regulatory requirements and Site Permit conditions. Participation in the Minnesota Board of Water and Soil Resources (BWSR) Habitat Friendly Solar program is not planned at this time.

The site has the following goals for vegetation management:

1) Establish regionally appropriate, perennial native vegetation inside the fence line of all Project facilities including under and between arrays and in perimeter areas where vegetative cover is required to meet or exceed requirements of the Project National Pollutant Discharge Elimination System (NPDES) permit.
2) Minimize the presence and abundance of noxious weeds and invasive species listed on the Minnesota Department of Agriculture's (MDA's) Noxious Weeds List.
3) Protect existing adjacent natural areas from impacts during construction and operation of the Project facility.

1.0 Vegetation Management Goals and Objectives

1.1 Introduction

Northern Crescent Solar has developed the VSMP to establish and maintain vegetation at the Project in a manner that allows for safe and reliable solar energy generation while providing environmental benefits during construction and operation of the Project and meeting MNDNR vegetation management guidance and the requirements of Faribault County's Renewable Energy ordinance (Section 35). The purpose of the VSMP is to provide measurable goals and objectives along with management guidelines for successfully establishing and maintaining vegetation for the life of the Site Permit.

The VSMP is a technical document that will be frequently referenced by Northern Crescent Solar and their contracted vegetation management professional through all phases of the Project including pre-construction through vegetation maintenance. The VSMP was developed during the project planning phase for the Project using the most current information available. The VSMP is intended to be a living document that is updated as needed to reflect changes in on-site conditions, clarifications of previous assumptions, and incorporation of gained knowledge providing for a better management of the project's vegetation. Upon completion of final construction, the VSMP will be reviewed and updated to reflect final construction conditions.

The site has three goals for vegetation including 1) establishing low-growing, regionally appropriate grass-dominated vegetation within the arrays and associated buffers, 2) minimizing the presence of noxious weeds and 3) protecting adjacent natural areas from impacts during construction and operation of the Project facility.

1.2 Goals and Objectives for Vegetation Establishment and Management

The following are goals and objectives for vegetation establishment and management associated with the Project:

Goal 1: Perennial Native Vegetation within Arrays and Associated Buffers

Establish and maintain low-growing regionally appropriate grass-dominated vegetation within the array fields and along the perimeter areas to stabilize the soil.

Objective(s)

- Establish and maintain low-growing regionally appropriate grass-dominated vegetation within the array field and along buffers to meet or exceed requirements of the Project National Pollutant Discharge Elimination System (NPDES) permit. Short-term and long-term vegetation management will be guided by performance standards outlined in this VSMP.
- Use maintenance practices that are consistent with typical industry standard practices including periodic mowing and spot herbicide treatment.
- Establish as many acres of perennial native vegetation as possible during the pre-construction and construction phases of the Project to provide soil stabilization, meet NPDES and the Project-

specific Stormwater Pollution Prevention Plan (SWPPP) requirements, and minimize post-construction re-vegetation efforts.

Goal 2: Noxious and Invasive Plant Species

Minimize the presence and abundance of plant species listed on the Minnesota Department of Agriculture's (MDA's) Noxious Weeds List.

Objective(s)

- Use Integrated Vegetation Management to reduce and eliminate MDA Noxious Weed-listed species.
- In areas within the Project boundary not developed for energy generation (i.e. outside of most fence lines and substations), maintain agricultural and other land uses.

Goal 3: Natural Areas Within and Adjacent to Perimeter Fencing

Protect existing natural areas within and adjacent to the perimeter fence including streams, drainages, wetlands, and potential native plant communities through site evaluation and mapping, implementation of best practices during construction, revegetation in accordance with practices outlined in the VSMP and Minnesota Department of Natural Resource (MNDNR) *Prairie Establishment and Maintenance Technical Guidance for Solar Projects* (MNDNR 2020).

Objectives(s)

- Evaluate and map existing natural areas within and adjacent to perimeter fencing to establish baseline conditions. Periodically update information during inspection and/or monitoring activities so current conditions can be compared against baseline conditions.
- Avoid disturbance to any areas outside of the perimeter fence buffers during construction using flagging and signage as shown on the civil site plans in **Appendix D**, contractor education, and erosion and sediment controls.
    - Wetlands within and adjacent to the perimeter fence will be protected from unauthorized fill and sediment during construction and operation of the Project in accordance with the SWPPP developed for the Project.
- Establish and maintain vegetation within the Project Area that meets the desired conditions outlined in the VSMP, which uses predominantly regionally appropriate native grasses to achieve permanent cover while minimizing the percent cover of MDA-listed noxious weeds and invasive species.
- Select regionally appropriate seed mixes based on local site conditions including hydrology and soil type.
- Protect potential adjacent native plant communities and wetlands from impacts due to facility construction and operation.

- Avoid disturbance to all potential native plant communities and wetlands outside of the perimeter fence.
- Apply herbicides within the perimeter fence and vegetated buffer in the appropriate manner that minimizes drift to adjacent plant and wildlife habitats as described in Section 4.8.3.
- Prioritize invasive species control in management units adjacent to native prairie and other natural communities through seasonal inspections, Early Detection Rapid Response, and collaborating with landowners adjacent to natural areas.

1.3 Monitoring and Implementation Technical Expertise

The implementation of the VSMP including pre-construction through monitoring and maintenance period activities will be completed by qualified vegetation management professionals. For the purposes of the VSMP and the Project, a qualified vegetation management professional includes individuals or contractors that have one or more of the following qualifications:

- Five or more years implementing and management natural vegetation with specific experience in applying techniques to establish and maintain regionally appropriate grassland communities and vegetation.
- Knowledge of plant identification with an emphasis on regionally appropriate vegetation.
- Post-secondary education or training in the field of natural resources such as degrees, course work, or certification programs.
- Applicable state certifications such as pesticide applicator, erosion control inspector, or erosion control installer.
- Uses specialized equipment characteristic of the tools of the trade for natural resource management.

Qualified vegetation management professionals may be internal staff from Northern Crescent Solar future facility owners, facility operators, or hired contractors. Likely over the course of the lifetime of the Project, it will be a combination of multiple entities implementing one or more portions of the VSMP. The role of the VSMP and its associated programs such as adaptive management and monitoring will be to provide a consistent basis for how vegetation will be managed for the lifetime of the Project.

2.0 Site Description

2.1 Project Location

The Project is located in Sections 7 and 18, Township 103 North, Range 27 West (Prescott Township), and Sections 11, 12, and 13 Township 103 North, Range 28 West (Verona Township) in Faribault County, Minnesota as shown in **Appendix A, Figure 1**. The western boundary of the Project is located approximately 1.7 miles south of the City of Winnebago and extends approximately 1.1 miles to the south and approximately 2.5 miles to the east. The western boundary of the Project is along the east side of U.S. Highway 169.

2.2 Project Size and Boundary Description

The entire Project Area includes approximately 1,179 acres that are divided into six blocks (Solar Development Areas A to F), **Appendix A, Figure 2**. General dimensions based on a point beginning at the northwest corner of the Project Area are described in **Table 1**. The current Project has eight proposed Solar Array Development Areas totaling approximately 930 acres of array panels and ranging from 7.4 acres to 237.5 acres (**Appendix A, Figure 2**).

Table 1. Reference Distances to Project Location

Point of Beginning	Description for Measurement	Length (feet)
Northwest Corner of Solar Array Development Area A	Northwest corner to southern-most boundary on the west side	5,500
	Northwest corner to eastern-most boundary	13,000
	Northwest corner to the southeastern boundary	14,100

2.3 Historic and Current Vegetation and Land Use

2.3.1 Historic Vegetation and Land Use

The Project Area falls within the historical Prairie Pothole region of Minnesota. Pre-settlement vegetation consisted primarily of native grasses and forbs with scattered trees (Oslund et al. 2010). Historically, wetlands were extensive and scattered throughout the landscape. Plant communities were maintained through large herbivore grazing and fire. Following settlement, much of the landscape was converted to agricultural land uses. Wetlands were drained or altered. Most of the native prairie was broken for either row-crop agriculture or cool season grass production (pasture or hay land). Aerial photography from 1938 indicates that most of the Project Area was converted to for some form of agricultural production, which has been the dominant land use through current conditions (**Appendix A, Figure 3**).

2.3.2 Current Vegetation and Land Use

U.S. Geological Survey National Land Cover Database (NLCD) from 2019 indicates that approximately 97 percent of the vegetation and land cover of the Project Area is cultivated crops, primarily corn and soybeans (**Appendix A, Figure 4; Table 2**). The remaining land cover is primarily scattered developed

open space (2.7 percent) with limited other land cover types. Aside from agricultural fields, the landscape also supports a patchwork of woodlands, wetlands, and drainages. The Project Area is surrounded by farmsteads with residences and outbuildings. Most of these farmsteads are at least partially surrounded by woodlands or shelterbelts, which fractionally prevents uninterrupted views of the surrounding landscape.

Table 2. NLCD Mapped Land Use within the Project Area

Land Use Type	Acres in Project Area	Percent of Total Acreage
Cultivated Crops	1,139.40	96.72
Developed Open Space	32.24	2.74
Developed Low Density	3.26	0.28
Developed Medium Density	1.70	0.14
Mixed Forest	0.95	0.08
Developed High Density	0.44	0.04
Total	**1,178.00**	**100.00**

Existing vegetation adjacent to the Project Area, to the north and south is fairly similar to the Project Area, primarily cultivated crops (**Appendix A, Figure 4**). In general, land use within the regional landscape is primarily cultivated crop agriculture. The Project Area is located between two relatively more natural areas within the cultivated crop-dominated landscape. The Blue Earth River and its associated floodplain and riparian corridor are approximately 1,700 feet to the western boundary of the Project. This area is a mosaic of emergent herbaceous wetlands, grassland covers (both grassland and pasture/hay) and scattered cultivated crops (**Appendix A, Figure 5**). On the eastern side of the Project Area, there is an open water, emergent herbaceous wetland and grassland complex within approximately 1,000 feet to 1,900 feet of the Project boundary that is oriented in a north-south direction that drains towards the north into Rice Lake.

An overview of data maintained by MNDNR indicating areas within and adjacent to the Project boundary that are identified as either having important ecological characteristics (native plant community, a Minnesota Biological Survey (MBS) site of biological significance, or potentially undisturbed lands) or protected status such as a conservation easement or designated state resource management area is provided in **Appendix A, Figure 6**. No direct impact resulting from the proposed Project to an existing site with important ecological characteristics will occur.

Establishing native, perennial vegetation within the Project Area may act as corridor to connect these natural areas for wildlife that are not influenced by the presence of fences, such as birds and winged insects. Additionally, ground-based wildlife such as insects and small mammals able to pass through fences will also likely benefit from the conversion of cultivated crops to native vegetation.

A detailed desktop review and field survey of potential native prairie areas within the Project Area was completed in October 2021 as part of preparing the Site Permit Application (SPA). Results of this

review/survey indicate no native prairie was located within the Project Area (Westwood 2021 *Project communications*).

Based upon a desktop review of NCLD from 2019 and Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO), land use within the Project Area is primarily agriculture. Approximately 46 percent of the Project Area is classified as prime farmland, while an additional 51 percent of the Project Area is classified as prime farmland if drained (Web Soil Survey 2022). An Agricultural Impact Mitigation Plan (AIMP) has been developed as part of the SPA for the Project to identify how Northern Crescent Solar will avoid, minimize, repair, and/or provide compensation for impacts to agricultural land from construction within the Project Area (**Appendix G**).

2.4 Soils

Information about the soils within the Project Area was obtained from a desktop review through the NRCS's online soil mapping tool, Web Soil Survey, which is an online mapping tool which utilizes SSURGO. SSURGO identifies 24 different soil units are present within the Project Area (**Appendix A, Figure 7**). In general, soils within the Project Area can be described as having silty clay loam, silty loam, or clay loam components. Madelia silty clay is the most abundant soil unit at 26.8 percent and the rest range between less than 0.1 to 16.4 percent (**Appendix B**). Muck soils are present in 0.4 percent of the Project Area. No soils are classified as having a sandy component.

According to SSURGO data, approximately 49 percent of the Project Area is classified as being poorly drained while approximately 26 percent is classified as somewhat poorly drained and approximately 4 percent is very poorly drained (**Appendix A, Figure 8**). Moderately well drained and well-drained soil units are located in the eastern portion of the Project Area. As further discussed in Sections 2.6 and 2.7, the Project Area contains a Faribault County public drain tile (Jurisdictional Ditch No 17f) and private agricultural field drain tiles are likely present.

Approximately 52 percent of the Project Area is classified as being either predominantly hydric or hydric soils (SSURGO data; **Appendix A, Figure 9**). Predominantly non-hydric soils make up the approximate remaining 48 percent of the Project Area. Approximately 42 acres of hydric soils are located in the CREP easement area located within the east-central portion of the Project Area. As previously discussed, no construction activities are planned for this area.

Nearly all of the Project Area is located on prime farmland/prime farmland if drained (**Table 3**). These acreages of prime farmland will be utilized for solar production and beneficial, native habitat during the life of the Project but would not be permanently removed from agricultural production.

Table 3. Prime Farmland Located in the Preliminary Development Area

Farmland Classification	Area (Acres)	Percent of Project Site
Prime Farmland	561.53	47.63
Prime Farmland if Drained	611.79	51.89
Farmland of Statewide Importance	4.96	0.42

Farmland Classification	Area (Acres)	Percent of Project Site
Not Prime Farmland	0.72	0.06
Total	**1,179**	**100.00**

Although there is a mosaic of soil units throughout the Project Area, the soil characteristics can generally be described as being relatively poorly drained. For vegetation establishment and maintenance purposes, native plants species associated with a native wet-mesic plant community were selected because they can tolerate extended periods of increased soil moisture. Where soil conditions are potentially less wet, either a mesic species-based or dry species-based seed mix will be used. Prior to initiating seeding activities, existing soil conditions and types will be field verified to confirm the appropriateness of the proposed seed mix. Adjustments to the species composition of the seed mixes will be made, as necessary.

Representative soil samples were collected in November 2023 within the proposed Project Area for geotechnical purposes. Samples were analyzed by Synergy Environmental Lab, LLC using standard soil sampling techniques. At three sample locations, soils were collected from a depth between 6 and 12 inches below the ground surface. Soil from this interval was collected and analyzed as a composite sample for each location, regardless of soil horizon. Samples were analyzed for pH, oxidation reduction potential (ORP), chloride, sulfides, and grain size distribution. **Appendix C** provides a summary of the soil characteristics.

The primary constraint, for the purpose of vegetation, is soil moisture. Soils associated with the Northern Crescent Solar and Storage Project tend to be poorly or somewhat poorly drained (78.6 percent). Approximately 12.3 percent of the soils are considered well drained, and 9.1 percent of the soils are considered moderately well drained. Soils are considered prime farmland, if drained, by NRCS. High moisture soils are conducive for robust vegetation establishment and cover but are also susceptible to soil compaction and nutrient levels that may facilitate weed growth. **Appendix B** lists mapped soil series and attributes within the Project Area. Figures showing SSURGO mapped soil units, drainage classification, and hydric rating are provided in **Appendix A, Figures 6–8**.

2.5 Topography

The Project is located within the Loess Prairies and Des Moines Lobe regions of the Western Corn Belt Plains Ecoregion (USEPA 2015). Topography within the Project Area is generally flat to slightly gently rolling. At the landscape level, the Project is elevated above drainages on the east and west (**Appendix A, Figure 6**). Elevation within the Project Area generally ranges from 1,090 to 1,110 feet above mean sea level (amsl; Figures 2). Based on SSURGO mapping, over 99 percent Project topography is relatively level to gently rolling with 0 to 6 percent slopes.

2.6 Hydrology

The Project is located in the Blue Earth River Watershed Basin and Le Sueur River Watershed Basin (MNDNR, 2024). Three National Hydrography Dataset (NHD) flowlines are mapped in the western portion of the Project Area; however, no NHD waterbodies, or MNDNR public water courses or water bodies are

mapped within the Project Area (Westwood 2021).

The Project Area is within the Prairie Pothole Region of Minnesota, an area characterized by a landscape mosaic of wetland and grassland complexes with limited surface drainages. Wetlands periodically become inundated and dewater based on seasonal and annual climatic conditions. During the agricultural development of the region, it was and currently is a common practice to install and maintain subsurface drain tiles to facilitate soil drainage and promote conditions that allow crop production in former wetland basins and other areas with seasonally wet conditions. One Faribault County public drain tile is located on the eastern half of the Project Area (Jurisdictional Ditch No 17f) and flows in a generally northwest direction as it exits the site (**Appendix A, Figure 10**). Private agricultural drain tiles may be present throughout the site.

The presence of wetlands and other surface water features within the Project Area was determined by a combination on-site review, a wetland delineation completed in 2021 and a desktop review in 2021 (Westwood 2021). Ten wetland basins comprising approximately 2.32 acres were field delineated within or adjacent to the Project Area footprint (**Appendix A, Figure 6**). Approximately 1.27 acres of delineated wetlands were within the existing CREP area. Approximately 0.69 acres are associated with a drainage swale beyond the southwest Project boundary. Neither of these areas will be directly impacted by the proposed Project. Four wetlands totaling approximately 0.36 acre were delineated in areas associated with road ditches or drainage features (**Appendix A, Figure 6**). Three of the four wetlands are located near areas where fences are proposed for the Project; however, impacts to existing wetlands will be avoided during final design. Construction plans will clearly identify the presence of wetlands and indicate that these areas should be avoided by construction contractors. Impacts to wetlands would potentially require a permit from the U.S. Army Corps of Engineers and the Minnesota Wetland Conservation Act Local Government Unit. No unauthorized regulated activities in wetlands will occur.

2.7 Drain Tile

Pre-construction farm field drain tile mapping challenges often exist on solar energy projects. Identifying and locating drain tiles is complicated because of missing, incomplete, and inaccurate mapping. Northern Crescent Solar will review available drain tile maps from participating landowners with land in the Project Area. Northern Crescent Solar will attempt to avoid and/or relocate existing drainage systems as needed for construction of the Project. Drain tile or drainage systems adversely affected by the Project will be identified, repaired, relocated, or replaced as needed to achieve the function and scope to its original size and capacity. Replacement or rerouting of tile will take place during construction or as it is identified in order to maintain the integrity of the drainage lines. This practice should minimize interruption of drainage on site or on neighboring farms that may drain through the Project Area leased property. New or modified drain tile systems installed by Northern Crescent Solar will be located using Global Positioning System equipment and archived in Project construction files and the Project Decommissioning Plan.

One Faribault County public drain tile is located on the eastern half of the Project Area (Jurisdictional Ditch No 17f) and flows in a generally northwest direction as it exits the site (**Appendix A, Figure 10**). Private agricultural drain tiles may be present throughout the site.

The following considerations will also apply:

- Tiles will be repaired with materials of the same or better quality as that which was damaged.
- Tile repairs will be conducted and located in a manner consistent with industry-accepted methods.
- Before completing permanent tile repairs, tiles will be examined within the work area to check for tile that might have been damaged by construction equipment. If tiles are found to be damaged, they will be repaired.

Northern Crescent Solar's design minimizes conflicts between known tile and the solar racking systems to minimize damage to tile to the extent feasible. In some areas, re-routing of the tile is necessary and this re-routing work will take place immediately prior to or during construction. Additional tile may be installed prior to or during construction to augment the existing system and to maintain the drainage profile of the site.

Following completion of construction, Northern Crescent Solar will inspect the Project Site after significant snow melt or rainfall events for evidence that tile systems are functioning adequately. If localized wet areas or standing water are observed, it is likely the tile system is not operating as anticipated. In this situation, the Tile Contractor will be reengaged to pin-point damaged tile that may have been missed during construction. Tile would be repaired following the process outlined above.

3.0 Vegetation Management

3.1 Vegetation Management Unit Background

Appendix D provides the current Preliminary Civil Construction Plans including facility layout and grading plans.

The current Project has nine proposed fenced array areas totaling approximately 930 acres ranging from 7.4 acres to 237.5 acres in size spread across six Solar Array Development Areas (**Appendix A, Figure 2**). A Solar Array Development Area includes the solar facility features such as arrays, inverters, and fence lines and it is the designated unit and scale at which vegetation will be managed within the Project Area. It also includes access roads, collection cables, substation, and battery storage, and other areas within the Project boundary that will revert back to the landowner's use following construction. Solar Array Development Areas were created for logistical and reporting purposes. If necessary, two Solar Array Development Areas were further subdivided based on the location and arrangement of individual adjacent Solar Array Development Areas. Management approach for each Solar Array Development Area is provided in Section 3.2.

The area inside the Solar Array Development Area for each array area will be seeded using one or more of the low-growing grass-dominated native seed mixes provided in **Appendix E** as presented in **Appendix A, Figures 11 – 16**. The planned distribution for the seed mixes is included in **Table 4**.

Table 4. Perennial Seed Mixes

Seed Mix Type	Total Acres
Wet-Mesic Native Grass-Only	909.67
Mesic Native Grass-Only	94.97
Dry Native Grass-Only	140.49
Stormwater and Detention Pond	24.87
Total	**1,170.00**

3.1.1 Collection Cables

Collection lines will be underground cables buried to a depth below what could be impacted by conventional farming. During construction, disturbed areas along collection lines will be revegetated using temporary seed mixes to maintain soil stability as discussed in Section 4. Upon the completion of collection line installation outside of fenced array areas of the Project, the ground surface will be restored to previous conditions and control of land use activities will revert to the landowner. Agricultural production would be allowed to continue in certain areas within the Project Area but outside of the fenced array areas during construction and operation of the Project. If a landowner opts to not continue row-crop agriculture, the land use management will be determined between Northern Crescent Solar and the landowner, and any areas maintained by Northern Crescent Solar will consist of low-growing native vegetation.

3.1.2 Planting Plan

Seed mix selection was based on the general soil characteristics, primarily the drainage and hydric classes (**Appendix E**). The majority of the Project Area that will be vegetated is a mosaic of hydric soils that are poorly drained (**Appendix A, Figures 8 and 9**). We have designed the seed mixes to accommodate a range of moisture regimes.

Within wet-mesic habitats, there are native grasses that prefer wetter conditions and others that prefer drier conditions. The Wet-Mesic Native Grass-Only Seed Mix in **Appendix E** was developed to include a range of grass species that can tolerate and maintain along the moisture spectrum. Due to the wet mesic conditions, localized prescriptive supplemental seeding may be required during the establishment and maintenance phases to achieve the desired vegetation cover. Initial seeding during the construction phase will focus on installing the three broad native seed mixes and allow localized site conditions determine where additional species are required. A separate seed mix will be used for stormwater ponds including around the fringe and the bottom of the basin, depending on designed drawdown period within the Project Area (**Appendix E**).

Table 5 provides a breakdown of total acreage to be seeded with the perennial seed mix for each land use within each Solar Array Development Area including arrays (under and between), stormwater ponds, inverters, other facility infrastructure, and open space between arrays and fence lines following the completion of construction activities. Proposed perennial vegetation outside of fenced areas is also included in Table 5 as the Perimeter Area; however, the landowner will have the option to keep the area outside of the fenced array in agricultural production. Substations, battery storage facility, and switchyards will not be able to be vegetated following construction as they will be used for specific Project operational uses. Those areas will be maintained as a combination of building/facility, impervious, or gravel surfaces. Proposed laydown yard(s) will revert to landowner's control following construction and, therefore, are not included in the total perennial vegetation acreage; however, during the construction phase, temporary vegetation will be installed and maintained in a manner as outlined in Section 3.3.

Table 5. Planned Coverage of Perennial Seed Mixes

Solar Array Development Area	Array Facility (Acres)	Stormwater Ponds (Acres)	Open Space Between Array and Fence Line (Acres)	Perimeter Area
A	127.28	4.98	27.11	
B	65.87	2.36	36.40	
C	244.93	5.70	40.58	
D	113.45	3.48	34.96	
E	87.71	3.61	18.97	
F	112.82	4.74	19.66	
Grand Total	**752.05**	**24.86**	**177.96**	**213.13**

3.2 Solar Array Development Area Descriptions

3.2.1 Solar Array Development Area A

Solar Array Development Area A is located along the northwestern corner of the Project Area (**Appendix A, Figure 11**). The management unit block includes one Solar Array Development Area, several collection lines that use an existing overhead transmission line corridor, and several stormwater ponds.

The majority of the soils within this Solar Array Development Area are classified within the spectrum of poorly drained will be seeded with the Wet-Mesic Native Grass-Only Seed Mix (**Appendix E**). Areas where soil conditions are less poorly drained, Mesic Native Grass-Only and Dry Native Grass-Only Seed Mixes will be used. Stormwater ponds will be seeded with a native species Stormwater and Detention Pond Seed Mix (**Appendix E**).

3.2.2 Solar Array Development Area B

Solar Array Development Area B is located along the western edge of the Project Area (**Appendix A, Figure 12**). Solar Array Development Area B includes arrays, fences, and several stormwater ponds. The battery storage facility, a substation, a secondary switchyard and operation and maintenance building are located along the western end of the Solar Array Development Area B and adjacent to Highway 169. The majority of the soils within this Solar Array Development Area are classified as being within the spectrum of poorly drained and will be seeded with the Wet-Mesic Native Grass-Only Seed Mix (**Appendix E**). A Dry Native Grass-Only Seed Mix will be used in areas with drier soil conditions (**Appendix E**) while a small portion in the northwest corner of the Solar Array Development Area will be seeded with Mesic Native Grass-Only Seed Mix. Stormwater ponds will be seeded with a native species Stormwater and Detention Pond Seed Mix (**Appendix E**).

3.2.3 Solar Array Development Area C

Solar Array Development Area C is located in the central portion of the Project Area (**Appendix A, Figure 13**). The Solar Array Development Area includes two Solar Array Development Areas (C1 – 2), fence lines, inverters, and stormwater ponds. The majority of this Solar Array Development Area consists of soils classified as having characteristics within the spectrum of poorly drained and will be seeded with a Wet-Mesic Native Grass-Only Seed Mix. In areas where the soil is well drained, either a Mesic Native Grass-Only or a Dry Native Grass-Only Seed Mix will be used (**Appendix A, Figure 13; Appendix E**).

3.2.4 Solar Array Development Area D

Solar Array Development Area D is located northeast corner of the Project Area (**Appendix A, Figure 14**). The Solar Array Development Area includes three Solar Array Development Areas (D1 – D3) and several stormwater ponds roads. Solar Array Development Areas D1 and D2 consist entirely of soils that are classified as having characteristics within the spectrum of poorly drained and will be seeded with a Wet-Mesic Native Grass-Only Seed Mix (**Appendix A, Figure 14; Appendix E**). Solar Array Development Area D3 predominately consists of soils that are classified as having characteristics within the spectrum of poorly drained and will also be seeded with a Wet-Mesic Native Grass-Only Seed Mix. In areas where the soils are well drained, either a Mesic Native Grass-Only or a Dry Native Grass-Only

Seed Mix will be used (**Appendix A, Figure 14; Appendix E**).

The area between Solar Array Development Areas not proposed for solar array development will remain in its current condition (**Appendix A, Figure 14**). This includes approximately 70 acres of CRP area between Solar Array Development Area D2, D3, and C and the area around the public drain tile between Solar Array Development Area D1 and D2 (**Appendix A, Figure 14**). Vegetation management for these areas will be the responsibility of the existing landowner.

3.2.5 Solar Array Development Area E

Solar Array Development Area E is located in the southwestern corner of the Project Area (**Appendix A, Figure 15**). This Solar Array Development Area includes arrays, fence lines, inverters, a collection line and stormwater ponds. The majority of this Solar Array Development Area consists of soils classified as having characteristics within the spectrum of poorly drained and will be seeded with a Wet-Mesic Native Grass-Only Seed Mix. In areas where the soil is well drained, a Dry Native Grass-Only Seed Mix will be used (**Appendix A, Figure 15; Appendix E**).

3.2.6 Solar Array Development Area F

Solar Array Development Area F is located in the southeastern corner of the Project Area (**Appendix A, Figure 16**). This Solar Array Development Area includes arrays, fence lines, inverters, and stormwater ponds. Soil characteristics are relatively evenly distributed between well drained and poorly drained soil types. In areas with poorly drained soil characteristics, a Wet-Mesic Native Grass-Only Seed Mix will be used (**Appendix A, Figure 16; Appendix E).** In areas where the soil is well drained, either a Mesic Native Grass-Only and a Dry Native Grass-Only Seed Mix will be used (**Appendix A, Figure 13; Appendix E**).

3.3 Vegetation Management Objectives

All Solar Array Development Areas have the same pre-construction/construction phase, short-term establishment phase, and long-term management phase objectives.

Pre-construction/Construction Phase Objectives

Pre-construction is defined as the period that begins when Northern Crescent Solar assumes control of parcels within the proposed Project Area to the initialization of construction activities associated with the solar facility. Construction is the period when the solar facility infrastructure is being installed. Construction activities can include, but not limited to, access road construction, array and collection cable installation, and fencing. Construction typically lasts 12–24 months and is anticipated to begin for the Project in the second to fourth quarter of 2025, with commercial operation in the fourth quarter of December 2026.

The following are the objectives for vegetation and soil management during the pre-construction phase prior to the installation of any solar facility assets or land disturbing activities:

- In areas where no civil construction (grading) is required as part of the construction activities, establish the designated Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed

Mix, or Dry Native Grass-Only Seed Mix to initiate long-term perennial vegetation during the soonest available optimal seeding window to increase the probability of successful vegetation establishment.

Construction schedule and sequencing will be an important driver for the seed mixes used to meet pre-construction/construction objectives. In areas where no civil construction is required and the pre-construction period allows for the establishment of perennial vegetation prior to construction, permanent low-growing regionally appropriate seed mixes (Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed Mix, and Dry Native Grass-Only Seed Mix) (**Appendix E)** will be used in the locations shown in **Appendix A, Figures 11–16**. In areas where no civil construction is required and the pre-construction period does not allow for adequate permanent perennial vegetation establishment prior to construction, temporary seed mixes would be used until the completion of construction in that area. Section 4 provides greater detail on the use of temporary seed mixes for soil and erosion control throughout the construction phase of the project.

Permanent perennial seed mixes were developed by referencing the guidelines outlined in MNDNR (2020) *Prairie Establishment and Maintenance Technical Guidance for Solar Projects* and multiple Minnesota Board of Water and Soil Resources (MN BWSR) seed mixes, including low-growing array mixes suitable for conditions present within the Project Area.

Each low-growing grass-dominated seed mix has the following characteristics:

- A minimum seeding rate of 40 seeds/sq. ft.
- 5 or more native grass/sedge species with at least 2 species of bunchgrass.
- Provides a combination of cool season grasses, warm season grasses, sedges/rushes that have a component of species that are shade tolerant.

In areas where civil construction (grading) is required as part of the construction activities, establish and maintain a designated temporary seed mix until grading is complete to provide soil stabilization and compliance with SWPPP conditions. If construction activities extend beyond the life cycle of a temporary seed mix, consider re-seeding areas, as necessary.

The following are the objectives for vegetation and soil management during the construction phase:

- In areas where perennial vegetation was established during the pre-construction phase, manage vegetation in a manner that supports remaining compliant with SWPPP conditions including mowing, herbicide applications, and re-seeding areas disturbed by construction activities.
- In areas where civil construction requires grading or land disturbance, establish the designated Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed Mix, and Dry Native Grass-Only Seed Mix in the locations as shown in **Appendix A, Figures 11–16** following the completion of grading activities and prior to the installation of solar facility assets such as arrays, collection cables, or fences. Use typical vegetation management practices such as mowing, spot spraying, and re-seeding to minimize establishment of MDA-listed noxious weeds.

- In areas where establishing the Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed Mix, or Dry Native Grass-Only Seed Mix immediately following the construction phase is not possible, use a temporary seed mix to remain compliant with SWPPP conditions and then establish permanent regionally appropriate grass-dominated vegetation during the soonest available optimal seeding window to increase the probability of successful vegetation establishment. Use typical vegetation management practices such as mowing, spot spraying, and re-seeding to minimize establishment of MDA-listed noxious weeds.

Post Construction Phase Objectives

Establishment and maintenance phases occur over the course of years. Demonstrating incremental progress towards a desired objective is important. **Table 6** provides a summary of performance criteria for the components of vegetation cover for both short-term and long-term objectives. Phase year benchmarks are included as a reference to measure during monitoring and to demonstrate trends or progress towards meeting and maintaining the long-term management objectives. Actual vegetation performance against reference year benchmarks will be used as indicator of the success of current vegetation management or the need for additional management or resources.

Table 6. Performance Criteria for Vegetation Cover

Phase	End of Growing Season Reference Year	Perennial Cover (Overall)	Perennial Cover (Regionally appropriate Species)	MDA-listed Noxious Weed Cover	Invasive Weedy Species Cover
Establishment	Year 2	>30%	>20%	<10%	<50%
	Year 4	>50%	>40%	<5%	<30%
	Year 5	>70%	>50%	<5%	<15%
Maintenance	Year 6+	>90%	>70%	<5%	<15%

Short-term Establishment Objectives

Short-term establishment objectives are defined as the desired conditions for vegetation management units in Years 0 to 5 immediately following construction activities and focus on establishing perennial regionally appropriate vegetation. Specifically, short-term establishment objectives include:

- Establish or maintain a temporary seed mix with greater than 70 percent vegetation cover during the seasonal periods each year when conditions are not conducive to establishing perennial vegetation to meet or exceed requirements of the project NDPES permit. This primarily includes areas that have not undergone initial perennial re-vegetation during pre-construction or construction phases.
- In areas that have not been re-vegetated with a perennial seed mix during the pre-construction or construction phase, install the designated regionally appropriate seed mix within the first 6

months following construction during the soonest available optimal seeding window to increase the probability of successful vegetation establishment.

- During Years 1 and 2, use mowing to reduce annual weed competition, minimize MDA-listed noxious weed species to less than 10 percent cover, minimize weedy species (See **Table 10** in Section 4.5 for a list of invasive species) to less than 50 percent cover, and establish 30 percent or greater perennial vegetation cover.
- During Years 1 and 2, use seasonal inspections and annual monitoring to identify areas where re-seeding may be required. Consider modifying or supplementing seed mixes to match local-scale conditions as additional information about the site is obtained. For example, supplemental re-seed areas with the Wet-Mesic Grass-Only Seed Mix in areas that end up being wetter than planned.
- By Year 4, establish 50 percent or greater perennial vegetation cover with less than 5 percent MDA-listed noxious weed species and less than 30 percent weedy species cover.
- Use spot-spraying with the appropriate herbicides to reduce and control weed species that cannot be controlled through mowing practices to less than 20 percent total cover.
- By the end of Year 5, perennial vegetation cover will be 70 percent or greater with 50 percent or greater cover from regionally appropriate species. MDA-listed species will be 5 percent or less of total cover and weedy species will be 15 percent or less of total cover.
- By the end of Year 5, reduce the number and need for mowing and herbicide treatments as a form of weed control, if possible, because each vegetation management unit has well-established low-growing regionally appropriate grass sod (or regionally appropriate grasses and forbs, where planned).

Long-term Management Objective

Long-term management objectives are defined as the desired conditions for vegetation management units in Year 6 to the end of the permit and will focus on maintaining regionally appropriate, perennial vegetation. Specifically, long-term management objectives include:

- Maintain 90 percent or greater perennial vegetation cover, including 70 percent or greater regionally appropriate grass-dominated vegetation cover or regionally appropriate grasses and forbs, where planned within each vegetation management unit as mapped using prescribed mowing, spot-spraying, and supplemental seeding to minimize MDA-listed noxious weed species. MDA-listed species will be 5 percent or less of total cover, and weedy species will be 15 percent or less of total cover.
- Initiate vegetation management activities if invasive weedy species cover becomes 20 percent or greater and/or MDA-listed noxious weed cover becomes 10 percent or greater to maintain meeting long-term management objectives.

4.0 Site Preparation, Vegetation Establishment, and Management Prescriptions

The placement of the seed mix will be refined if the site design is revised, but the general approach to the installation of the planting mixes based on the current design is provided. The Faribault County Zoning ordinance for renewable Project sites (Section 35, Section 9, Subdivision 3.7.b) requires that ground cover be installed and maintained that meets the standards in Minnesota Statute 216B.1642 for the duration of the Project until facilities are decommissioned. **Table 7** demonstrates how vegetation management for the Project addresses both the County ordinance and the State statute. Currently, Northern Crescent Solar does not intend to participate in MN BWSR's Habitat Friendly Solar program; however, implementing the practices in this VSMP will provide benefits to local area wildlife and reduce stormwater runoff and erosion from the site.

Table 7. Proposed Establishment and Maintenance Activities

Management Activity	Beneficial Outcome
Planning, Design, Engineering, and Construction Phases	
Use native grass species to the extent practicable within the Project Area.	Long-term reduction in stormwater runoff and erosion
Avoid and minimize disturbance to environmentally sensitive areas such as existing wetlands, drainages, and existing high quality natural vegetation	Maintain existing habitat; protect existing water resources
Use temporary cover crop seed mixes to stabilize disturbed soils until perennial seed mixes can be installed.	Prevent soil erosion and reduce stormwater runoff
Establishment Phase	
Limit mowing height to greater than 6 inches above the ground.	Provide ground nesting bird habitat; reduced stormwater runoff and erosion
Restrict or limit mowing activity to periods of the season that reduces potential disturbance to ground nesting birds and invertebrate pollinators.	Limit disturbance to ground nesting birds; provide overwintering habitat for invertebrate species
Install and maintain bird and pollinator nest boxes in suitable and accessible areas.	Nesting and overwintering habitat
Use herbicides that minimize the potential for off-target damage, including prohibiting the use of any pesticide containing neonicotinoids.	Reduce potential for negative impacts to wildlife and native vegetation
Educate and inform adjacent landowners about the potential for pesticide drift.	Reduce potential for negative impacts to habitat (vegetation) and direct exposure of wildlife to pesticides
Maintenance Phase	
Limit mowing height to greater than 6 inches above the ground.	Provide ground-nesting bird habitat; reduce stormwater runoff and erosion
Restrict or limit mowing activity to periods of the season that reduce potential disturbance to ground nesting bird habits and invertebrate pollinators.	Limit disturbance to ground nesting birds; provide overwintering habitat for invertebrate species

Management Activity	Beneficial Outcome
Limit or rotate the total acreage mowed seasonally or annually to allow for a variety of vegetation heights and thatch depths across a management unit block.	Nesting and overwintering habitat; limit disturbance to ground nesting birds; reduce stormwater runoff and erosion
Install and maintain bird and pollinator nest boxes in suitable and accessible areas.	Nesting and overwintering habitat
Use herbicides that minimize the potential for off-target damage including prohibiting the use of any pesticides containing neonicotinoids.	Reduce potential for negative impacts to wildlife and native vegetation
Educate and inform adjacent landowners about the potential for pesticide drift.	Reduce potential for negative impacts to habitat (vegetation) and direct exposure of wildlife to pesticides.

The Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed Mix, or Dry Native Grass-Only Seed Mix will be installed in fenced areas and perimeter areas outside of the fence that require permanent vegetative cover (**Appendix A, Figures 11–16**). There will be no planting on the internal access roads, the substation, switchyard, BESS, or operation and management facility areas, along public road ROWs, or in areas identified as streams or wetlands where existing vegetation is present. A Stormwater and Detention Pond Seed Mix is provided in **Appendix E** for vegetation of permanent stormwater ponds.

4.1 Site Preparation

The majority of land use within the preliminary development area within each Solar Array Development Area is row-crop agriculture, either corn or soybeans. Depending on construction timing, row-crops may be harvested prior to construction, mowed down to remove vegetation, or not planted, if construction occurs between fall and late spring. In agricultural settings, annual weed species are typically the most common problem prior to initiating re-vegetation efforts followed by perennial weed species. Site preparation and the sequence of activities will ultimately be determined when construction starts.

Temporary and perennial vegetation seed mixes, herbicide treatments, and mowing will be used in combination to prepare the site for re-vegetation while keeping soil stabilized during construction and reducing the establishment of noxious or invasive species that will be detrimental to both short-term and long-term vegetation establishment and maintenance. **Table 8** provides guidance for a planned schedule and sequence of site preparation activities under different construction start scenarios. **Table 8**, along with consultation from a qualified vegetation management professional will be used to develop the appropriate prescription based on the final Project schedule. **Table 9** and Section 4.7 provide additional information about preferred annual seeding time periods for temporary seeding and Section 4.8 provides additional information about perennial seeding.

Table 8. Site Preparation Sequence and Activities Based on Construction Start Period

Pre-construction Period	Pre-construction Site Conditions – Seeding Preparation	Pre-construction Seeding	Construction Start
Spring	Previous row-crop – None Winter crop - Harvest winter crop	Perennial seed mix in optimal seeding window – Areas that will not be graded (April 1 – June 30) Temporary seed mix (spring/fall seed mix) – Areas to be graded (April 1 – June 1)	Summer
Summer	Terminate row-crop – Mow, disk or herbicide application	Perennial seed mix in optimal seeding window – Areas that will not be graded (June 30 – August 1 Not recommended – Assess current seasonal weather trends; Monitor and prepare for supplemental seeding) Temporary seed mix (summer seed mix) – Areas to be graded (May 1 – August 15)	Fall
Fall	Harvest row-crop	Perennial seed mix in optimal seeding window – Areas that will not be graded (September 10 – October 31, less than ideal; November 1 – Frozen conditions; when soil temperature is 40°F or less) Temporary seed mix (spring/fall seed mix) – Areas to be graded (August 1 – September 15)	Winter or spring
Winter	Previous row crop - None	Perennial seed mix in optimal seeding window – Areas that will not be graded (February 15 – April 7 – Frost Seeding; Complete when snow depth is 1 ft or less) Temporary seed mix (winter mix) – Areas to be graded (September 1 – November 15)	Spring

4.2 Soil Handling

Within a Solar Array Development Area, grading may be required to provide flat surfaces for the installation of arrays (**Appendix D**). Grading contractors will be responsible for segregating and stockpiling grading spoils, the excess material generated from construction activities, by soil layer. Excess material will be placed in a manner that preserves soil health and integrity. Typically, this will entail spreading subsoils first and then placing topsoil material over subsoils. Excavation and grading requiring trenching (temporary disturbance of the ground to bury facility infrastructure) will segregate soil material by layer and re-fill trenches in the reverse order the soil layer was encountered so that topsoil layer is placed at the surface and depth of topsoil is maintained as much as possible.

Appropriate soil handling as described in the Agricultural Impact Mitigation Plan (AIMP) (**Appendix G**) will be implemented to preserve soil health so that the Project may be returned to agricultural production after the life of the Project.

4.3 Mitigation of Soil Compaction Prior to Seeding

To minimize soil compaction, grading and facility contractors will use areas proposed as access roads as much as possible for travel. Following construction activities and prior to the installation of regionally appropriate seed mixes in areas where temporary seeding occurred, areas of heavy use such as the laydown yard may be tilled or ripped to alleviate soil compaction and then disked to provide a uniform surface. Depending on a combination of soil conditions, the time elapsed between disking and seeding, and methods used for seeding, rolling the seedbed with a cultipacker may be necessary. A qualified vegetation management professional will be consulted for recommended techniques for each vegetation management unit prior to seeding.

Wet areas such as in hydric soil units will be avoided to the extent practicable to minimize compaction and de-compaction activities. The AIMP (**Appendix G**) provides greater detail regarding best management practices that may be implemented to alleviate compacted soils should they occur.

4.4 Seedbed Preparation

Potential steps for seedbed preparation are determined by the timing of construction and the installation of the regionally appropriate seed mix. Prior to seeding, a survey of pesticide use by the previous farm operators should be completed to determine if potential pesticide carryover will be an issue that prevents or impacts regionally appropriate seed germination rates. In locations where carryover may be a potential, the extended use of temporary cover crops or other carryover resistant vegetation may be required until the residual effect potential has decreased. A qualified vegetation management professional should be consulted to determine the potential for pesticide carryover. **Table 9** provides potential seedbed preparation activities based on the timing and conditions of the Solar Array Development Areas post-construction.

Table 9. Seedbed Preparation Activities Based on Seedbed Conditions Prior to Seeding

Pre-Seeding Seedbed Conditions	Potential Seedbed Activities
Not compacted, bare ground (Typical tilled row-crop field)	• Cultipacking to firm seed bed, depending on seed installation technique and equipment.
Harvested row-crop field	• Soybeans – None. • Corn – Mowing stalks to mulch corn stover or raking and baling to remove corn stover.
De-compacted, no existing vegetation (Areas where grading occurred)	• Disk to provide uniform surface when post-grading surface would impact seed installation or growth. • Cultipacking to firm seed bed, depending on seed installation technique and equipment.
Not compacted, temporary seed mix present, no large areas of annual or perennial weeds	• Spot spray areas of annual or perennial weeds to reduce competition and prevent weed establishment. • Depending on life stage and density of temporary seed mix, consider spraying, mowing, or rolling prior to or immediately after seeding to terminate crop, reduce competition and provide mulch layer for regionally appropriate seeding.
Not compacted, sparse to no temporary seed mix present, extensive areas of annual or perennial weeds	• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to reduce weed competition.
Existing vegetation is temporary cover crop that includes species such as winter wheat.	• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to terminate crop either prior to or immediately after seeding.
Existing vegetation is pasture/hay land, but **NOT** native sod	• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to reduce vegetation competition.
Wet areas with existing invasive vegetation or bare ground.	• Broadcast spray within a non-selective, non-residual herbicide such as glyphosate. Consult a qualified vegetation management professional to determine if a wetland-approved formulation is required based on site conditions.
Existing vegetation is NATIVE sod	• Do not impact the sod and consult a qualified vegetation management professional.

4.5 Invasive Species Prevention

Invasive plant species, including MDA-listed noxious weeds and other weedy species such as reed canary grass, can negatively impact desired vegetation establishment and management for extended periods of time and prevent accomplishing vegetation management goals and objectives. MDA-listed noxious weeds (**Table 10**) are plant species designated under state law that require some form of control or eradication by landowners, if present and requested by state or local officials. Failure to comply with a formal request to control or eradicate can result in the landowner being responsible for the financial cost of work performed by others at the request of the inspecting governmental unit.

Table 10. MDA-listed Noxious Weeds

MDA-listed Noxious Weed Species			
Eradicate – Not currently known to be present or widely distributed in the state. If found, all above and belowground parts must be destroyed. Transportation, propagation, or sale is prohibited by law.			
Black swallow-wort	Dalmatian toadflax	Japanese honeysuckle	Palmer amaranth
Brown knapweed	Diffuse knapweed	Japanese hops	Red hailstone
Common teasel	Giant hogweed	Johnsongrass	Tree of heaven
Cutleaf teasel	Grecian foxglove	Pale swallow-wort	Yellow starthistle
Control – Established throughout or in regions of the state. If found, control efforts shall focus on preventing the spread, maturation, and dispersal of propagating parts such as seeds, rhizomes, and root parts. Herbicide applications that reduce the local abundance or mowing that prevents seed formation would be control techniques. Transportation, propagation, or sale is prohibited by law.			
Bohemian knotweed	Giant knotweed	Narrowleaf bittercress	Purple loosestrife
Canada thistle	Japanese knotweed	Non-native phragmites	Round leaf bittersweet
Common barberry	Leafy spurge	Plumeless thistle	Spotted knapweed
Common tansy	Meadow knapweed	Poison hemlock	Wild parsnip

MDA-listed Noxious Weed Species			
Restricted – Widely distributed in the state and is detrimental to human and animal health or the environment, but feasible control is limited to prohibiting importation, sale and transportation. **(Presence of restricted-listed species on-site will not require management action by law; however, due to the widespread distribution and negative impact to natural communities, control or management actions for these species is highly recommended to achieve the desired vegetation conditions for the Project.)*			
Amur honeysuckle	Crown vetch	Lesser calendine	Siberian peashrub
Amur silvergrass	European alder	Morrow's honeysuckle	Tatarian honeysuckle
Bell's honeysuckle	Garlic mustard	Multiflora rose	Wild carrot/Queen Anne's lace
Black locust	Glossy buckthorn	Porcelain berry	Winged burning bush
Common or European buckthorn	Japanese barberry cultivars	Saltcedar	

Invasive plant species are primarily non-native, but sometimes native plant species that can be aggressive and outcompete other plant species. **Table 11** provides a list of plant terrestrial plant species that MNDNR considers to be invasive to natural areas (https://www.dnr.state.mn.us/invasives/terrestrialplants/index.html#text-1-4).

Table 11. Non-native Terrestrial Plants Considered to be Potentially Invasive in Natural Areas

Flowering plants			
Birdsfoot trefoil	Cow vetch and hairy vetch	Giant hogweed	Poison hemlock*
Brown, diffuse, and meadow knapweeds	Creeping Charlie	Grecian foxglove	Queen Anne's lace*
Bull thistle	Crown vetch or axseed*	Hoary alyssum	Spotted knapweed*
Butter and eggs	Cut-leaved teasel	Leafy spurge*	White and yellow sweet clover
Canada thistle*	Dalmatian toadflax	Musk or nodding thistle	Wild parsnip*
Common tansy*	Erect hedgeparsley	Orange hawkweed	Yellow starthistle
Common teasel	Garlic mustard*	Oxeye daisy	
Grasses			
Amur silver grass*	Johnsongrass	Reed canary grass	Smooth brome grass
Trees and shrubs			
Amur cork tree	Callery Pear	Norway maple*	Tree of heaven
Amur and Tatarian maple*	Japanese barberry*	Russian olive	Winged burning bush*
Autumn olive	Multiflora rose*	Saltcedar*	
Black locust*	Non-native bush honeysuckles*	Siberian elm	
Buckthorn*	Non-native knotweeds*	Siberian pea shrub*	
Vines			
Black and pale swallow-wort	Japanese hops	Red hailstone	Round leaf bittersweet*

*Denotes species is also an MDA-listed noxious weed, but not required to be eradicated, if found.

The best strategy is to make prevention and control from the start of construction activities a priority. Strategies to reduce invasive (weedy) species during construction include:

- Require construction equipment comes to the construction site free of soil and existing vegetation and leaves the site free of soil and existing vegetation.
    - Have contractors self-inspect all equipment arriving and departing from the site and prepared to provide proof of inspection upon request.
    - Designate wash stations for cleaning equipment and monitor cleaning areas for invasive species.
- Survey construction areas and adjacent lands prior to construction to determine the presence of MDA-listed noxious weeds, other invasive plants species, and native vegetation. Identify in project maps and with signage areas where noxious weeds or native vegetation is located to prevent equipment from picking up and spreading seed and plant parts or disturbing native vegetation to make it more susceptible to invasive species establishment.
- Monitor the site on a seasonal basis to identify, map and treat areas where invasive species are present.

- In areas of known invasive species, make herbicide treatment a priority before regionally appropriate seed is installed.

When vegetating areas with a history of row-cropping, both annual and perennial noxious weeds and invasive plant species will be a primary threat to successfully establishing vegetation due to existing seedbanks and the potential for seed sources in adjacent row-crop areas. Mowing and herbicide treatments that are completed prior to seed development are effective means to control annual weed species and reduce the spread of perennial weed species. Well-established regionally appropriate grass-dominated vegetation (years 6+) may be less susceptible to invasive species establishment; however, it is anticipated that invasive species management will be an on-going priority for vegetation management throughout the lifetime of the project. Within the Project Area, the period between construction and vegetation maintenance is when the vegetation management units will be most vulnerable to invasive species establishment.

4.6 Soil Amendments

Soils in the Project Area have been historically cropped with nitrogen fixing legumes (soybeans) and augmented with nitrogen fertilizer for corn. Typically, the fertility is constrained by excess fertilizer rather than lack thereof. Likewise, seed mix design selects species and strains that do not require fertilizer, water, or pesticides to establish and maintain. There are no soils amendments required for the Project.

4.7 Temporary Vegetation

Temporary seed mixes may be used during the pre-construction, construction, and post-construction phases when conditions or timing does not allow for the installation and establishment of perennial vegetation and in areas where soil grading occurred during construction. Temporary seed mixes serve multiple purposes such as soil stabilization, reduce weed pressure, and provide a nurse crop/mulch to native seedings. Temporary seed mixes were developed for this VSMP and Project that include multiple species to increase the likelihood that temporary vegetation will grow on a variety of site and seasonal conditions (**Table 12 and Appendix E).** MN BWSR 2019 *Native Vegetation Establishment and Enhancement Guidelines*, Minnesota NRCS guidance (USDA 2018), and resources available through the University of Minnesota Extension were referenced when developing temporary seed mixes.

The success of seedings that occur between October 15 and April 1 (fall to dormant season seeding) will ultimately be dependent on seasonal weather conditions that influence soil temperature and soil moisture. If fall and dormant season temporary seed mix seedings occur, Northern Crescent Solar will monitor those areas during the following spring to determine the germination rate and winter kill. Areas will be re-seeded, as necessary. Seeding rates should be increased by 50 percent when broadcast seeding is used and/or cultipacking or dragging is not used to incorporate the seed into the soil.

Table 12. Temporary Seed Mixes for Areas where Perennial Vegetation is not Immediately Available

Seed Mix	General Recommended Seeding Dates*
Spring-Fall Season	April 1 – June 1 August 1 – September 15

Seed Mix	General Recommended Seeding Dates*
Summer Season	May 1 – August 15
Winter Season	September 1 – November 15
*Determine appropriate mix based on seasonal trends and conditions.	

4.8 Perennial Vegetation Seeding and Planting

Two factors that are important to a successful seeding is the timing of the seeding and the equipment used. Based on the low-growing native seed mixes proposed for the Project for each Solar Array Development Area, MN BWSR recommends the following dates:

- February 15 to April 7, when broadcast frost seeding;
- May 15 to June 30, after soil temperature is above 60^{O} F; and,
- After November 1, in particular when soil temperatures are below 60^{O} F.

In areas not stabilized with perennial vegetation prior to or following construction, temporary seed mixes will be used to vegetate or maintain vegetated management units until a native seeding window is available.

Native seeding can be completed through either drill-seeding or broadcast seeding. In all likelihood, there may be a combination of techniques used given the size of the Project Area, timing of seeding, and effectiveness of equipment around arrays. Contractors may use no-till drills that are specialized for installing native seed to increase the probability of a successful seeding. Example manufacturers include Truax or Great Plains. Native seed may be broadcast using a Vicon or equivalent spreader. It is recommended that areas broadcast seeded are rolled with a cultipacker to improve seed-soil contact. Seed rates (lbs/acre) listed in **Appendix E** should be increased by 1.5 times the rate when seed is installed via broadcast seeding and/or cultipacking is not an option (USDA 2016).

Seed availability through commercial vendors can vary year to year based on market demand, previous year's growing conditions, and individual species seed production. For the Project, seed for designated mixes will be required over several years and include the pre-construction, construction, and vegetation establishment phases. Species substitutions based on limited availability will likely be necessary.

When selecting substitutions for designated mixes, it is important to consider the plant functional group that a species belongs to and select species from same group. For example, if a warm season grass species is unavailable, a different warm season grass species with a similar plant height should be selected and not a cool season grass. The Minnesota Department of Transportation (MNDOT) maintains and annually updates an approved seed substitution list for many native species based on querying approved seed vendors. In the event that one or more species in **Appendix E** are not available or are available at limited quantities, both the MN BWSR and MNDOT lists should be referenced to select appropriate substitutions. Nurseries specializing in native plants can also provide recommendations for substitutions. A list of native plant vendors can be found within the MN DNR (https://www.dnr.state.mn.us/gardens/nativeplants/suppliers.html).

4.8.1 Array and Fence Line Seeding

One of the objectives for seeding within the arrays and Project fence lines is to install a native grass-dominated seed mix that is meets the guidelines outlined in the MNDNR (2020) *Prairie Establishment and Maintenance Technical Guidance for Solar Projects.* To accomplish this, Northern Crescent Solar is proposing to establish low-growing grass-only native seed mixes with the following characteristics:

- A minimum seeding rate of 40 seeds/sq.ft.;
- Seven or more grass/sedge species with at least 2 species of bunchgrass;
- Maximum mature vegetation height of 3 feet or less; and,
- Includes shade-tolerant species.

Appendix E provides detailed tables of the proposed seed mixes including species name, seeding rate, and seeds/sq.ft. Seed mixes were developed from consulting MN BWSR's Low Growing Solar Array Mix – Southwest seed mix, Low Growing Solar Array Moist Soils-South, MNDNR prairie guidance for solar Project (MNDNR 2020), and native plant nursery staff. **Appendix A, Figures 11–16** delineate generally where the different seed mixes should be used throughout the proposed re-vegetation areas based on the current facility design.

As part of the Adaptive Management program (Section 5.3), modifications to seed mixes, especially during the establishment phase, may be required based on greater understanding of local or micro-scale site conditions, climatic trends, individual species performance, and market availability. Decisions about potential species substitutions, additions, or subtractions will be based a combination of the following:

- Maintaining a minimum seeding rate that has shown to be effective in establishing vegetative cover on recently disturbed surfaces;
- Providing a mix of bloom times, growth periods (cool season and warm season), and growth types (bunchgrasses vs. sod-forming grasses);
- Referencing recognized sources of information for acceptable substitutions and seed mix design such as MNDOT and MN BWSR; and,
- Integrating lessons learned about vegetation management from others within solar energy industry.

4.8.2 Stormwater Detention Area Planting

In areas designated as stormwater detention pond areas within each Solar Array Development Area, MN BWSR's Stormwater South and West will be used (**Appendix E**). Vegetation management around stormwater detention areas will be similar to other vegetation management techniques; however, due to the potential for ponded water or wet conditions, equipment access may be limited with more work being conducted by hand. Qualified vegetation management professionals should have the equipment and expertise to address the needs of these areas to establish and maintain the native plant community.

4.8.3 Pesticide Drift

The Project Area is located within an intense agricultural landscape. There is the potential pesticide drift

or overspray from adjacent landowners to negatively impact native vegetation. Pesticide drift can kill or harm off-target native vegetation and create opportunities for invasive species establishment. Landowners will be notified annually in the spring of the locations of native seeding and provided information on techniques to avoid pesticide drift. During monthly vegetation inspections and annual vegetation monitoring activities, areas where pesticide drift has occurred will be documented and Northern Crescent Solar staff will work with the adjacent landowner to avoid re-occurrence. Financial compensation may be pursued for repeated occurrences.

4.9 Pre-Construction and Construction Phase Practices (Prior to Year 0)

As previously discussed, construction may take one or more years before it is complete. However, one of the goals and objectives for the overall project is to vegetate as many acres as possible to a perennial low-growing regionally appropriate cover type by establishing the Mesic Native Grass-Only Seed Mix, Wet-Mesic Native Grass-Only Seed Mix, and Dry Native Grass-Only Seed Mix during the pre-construction phase. To accomplish this, re-vegetation will focus on areas that do not require grading prior to installing facility infrastructure. Vegetation management within areas of management units that have been seeded with a perennial seed mix during the pre-construction phase will be managed in a similar fashion to short-term establishment practices described in Section 4.10. Mowing, spot spraying, and re-seeding disturbed areas are the likely main tools that will be used. Construction activities such as running over vegetation with equipment, localized excavation to install posts for arrays, or burying collection lines may cause limited disturbance that may require additional re-seeding. The need to re-seed will be managed on a case-by-case basis.

Temporary seed mixes will be used to stabilize soil and remain compliant with SWPPP permit conditions. The need to re-seed areas with temporary seed mixes during the construction phase is anticipated when the temporary seed mix is at the end of its life cycle and/or when ground disturbing activities occur, but the next optimal seeding window for perennial vegetation does not occur for several months.

It may be the case where a management unit is a mosaic of perennial vegetation, temporary seed mixes, and areas under active construction. Each vegetation type will be managed in the appropriate manner until the entire management unit can be transitioned into the short-term establishment period (Year 0).

4.10 Short-Term Establishment Practices (Years 0 – 5)

The period between native seed and plant installation (Year 0) through the sixth growing season (Year 5) is defined as the establishment period (MN DOC 2021). The key priorities for establishment during this time period include:

- Reducing competition from annual weeds that shade out or smother native plant seedlings;
- Preventing the establishment of perennial invasive or noxious species; and,
- Re-seeding in areas where vegetation is not establishing or is impacted by herbicide applications necessary to control invasive species.

Understanding the expectations for vegetation during the establishment period is an important factor in success and determine vegetation management actions. Many plant species native to this area are deep-rooted to access moisture during hot, dry summer months and to store energy during the winter months.

Typically, the first growing season or two, seedlings invest a lot of energy in root growth while maintaining sparse above ground vegetation. In Years 3 and 4, there is a marked increase in above ground and vegetation density and abundance increases to the point that it can shade out annual plant species and more easily compete with invasive species.

4.10.1 Mowing

Mowing during the establishment period is typically the most common and cost-effective tool. **Table 13** provides mowing guidelines for both timing and vegetation heights. It is important to adjust the timing of mowing based on an individual year. Spring and summer temperatures and precipitation ultimately determine when mowing should occur.

Mowing too frequently or too low of a height can negatively impact native vegetation and make establishment more difficult. A qualified vegetation contractor will have the experience and the equipment to correctly mow native plantings. Using a mower that does not windrow thatch that can smother native seedlings or can be set at the appropriate height such as a flail or rear-discharge mower is key. In the event of a build-up of thatch, raking and haying may be considered.

Specialized mowing equipment may be used around and under arrays. Additionally, hand work using brush cutters and string trimmers may be necessary to access difficult areas around arrays and in wet areas where equipment would cause vegetation disturbance. In stormwater detention areas, hand trimming or low ground pressure equipment may be used to prevent rutting and ground disturbance.

During the establishment phase, mowing typically occurs throughout the entire site. Within a Solar Array Development Area, it may be possible that some areas require spot mowing on a more frequent basis because of the presence of fast-growing weed species. Conversely, there may areas that require less mowing due to both sparse and weedy vegetation or that desired vegetation quickly develops and becomes well-established. The vegetation will be inspected monthly during the growing season to inform appropriate mowing and herbicide management.

Table 13. Mowing Guidelines During Establishment Period

Initial Mowing	Mowing Height	Mowing Period	Mowing Triggers
Late spring/early summer when vegetation reaches a height of 12 – 18 inches	Finished height of 6 inches or greater	May – November, typically two events per growing season	Flowering annual weeds Dense annual vegetation

4.10.2 Herbicide Application

Herbicide application following seed installation and during the establishment period is likely to primarily be spot spraying to prevent large areas devoid of vegetation being created. Spot spraying consists of using low volume equipment applied manually through either backpack sprayers or equipment mounted hand sprayers. Localized broadcast spraying can occur in instances when weeds and invasive species are present in patches large enough or dense enough that off-target damage to native vegetation can be justified given the benefit to long-term management. Areas treated with herbicide may be mapped and

accessed to determine if supplemental seeding is required.

Two important considerations to herbicide applications include herbicide selection and herbicide timing. **Table 14** provides a list of preferred herbicides to use during vegetation establishment and maintenance periods. Herbicide formulations and labeled uses are constantly being updated so **Table 14** should not be considered a comprehensive list. Herbicide applicators should read and understand the herbicide label and apply at labeled rates to labeled species. Additionally, the use of herbicides that have a residual effect should be avoided to prevent unintended impacts to perennial seed germination and persistence. None of the herbicides listed in **Table 14** are classified as neonicotinoids, a class of insecticide that is believed to have a negative impact on pollinating insects.

Table 14. Environmental Information for Proposed Herbicides

Active Ingredient	Herbicide Type	Potential Uses	Environmental Fate[1,2]			
			Water Solubility	Soil Half-life	Mineral Soil Sorption Coefficient KOC / FAO Mobility Classification[3]	Groundwater Ubiquity Score (GUS)[4] / Potential to Reach Shallow Groundwater
Glyphosate (Round-up, Rodeo, Accord, AquaNeat, Touchdown)	Non- selective systemic foliar	Non-selective treatment of grasses and broadleaf plants	Very soluble	3.6 days	40,000 in silty/loam soils / Immobile	-0.25 in silty/loam soils / Very unlikely
2,4-D (Amine, Crossbow, Trimec, Weed B Gon)	Broadleaf systemic foliar	Selective treatment of weedy and invasive broadleaf plants	Moderately soluble	2.9 days	88 in silty/loam soils / Mobile	1.13 in silty/loam soils / Unlikely
Triclopyr (Vaslan, Garlon 3a, Garlon 4)	Broadleaf selective foliar	Selective treatment of woody plants	Moderately soluble	13 days in unknown soil	93.5 in unknown soil / Mobile	2.26 in unknown soil / Moderate potential
Aminopyralid (Milestone)	Broadleaf selective foliar Species selective	Specific noxious and invasive weeds	Very soluble	81.5 days in unknown soil	2.33 in unknown soil / Highly Mobile[5]	6.94 in unknown soil / Likely[5]
Clopyralid (Transline, Stinger)	Broadleaf selective foliar Species selective	Specific noxious and invasive weeds Asters and legumes	Very soluble	12.8 days	2.64 in silt loam / Highly Mobile[5]	3.96 in silt loam / Likely[5]
Clethodim (Select, Arrow, Section, Volunteer)	Grass- selective systemic foliar	Selective treatment of weedy and invasive grasses	Very soluble	3 days in unknown soil	137.5 in unknown soil / Moderately mobile	0.89 in unknown soil / Unlikely

[1] Information from Herbicide Properties Tool at the National Pesticide Information Center – Oregon State University. Accessed online on 8/7/2020 at http://npic.orst.edu/HPT/#.
[2] Reported for silty/loam or silt loam soils unless otherwise stated in the Herbicide Properties Tool search results.
[3] Based on FAO Mobility Classification in *Guidance for Reporting on the Environmental Fate and Transport of the Stressor Concern in Problem Formulations*. Accessed online on 8/7/2020 at https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/guidance-reporting-environmental-fate-and-transport#II_C.
[4] Potential to Reach Shallow Groundwater based on discussion in the Herbicide Properties Tool search results.
[5] Appropriate for low volume foliar herbicide applications targeting individual plants or clumps of plants.

The use of native grass-only seed mixes allows for the use of broadleaf-specific herbicides that will be effective against many noxious and invasive plant species while minimizing the opportunity to off-target damage to native grass vegetation. Herbicide applications will be timed when the plants are actively

growing and with enough time prior to a precipitation event so that the herbicide can be absorbed or become rainfast. Seasonally, herbicide applications can be timed to occur early in the growing season before many native species have started to grow or after the growing season has ended for many warm season species, but while many cool season species such as reed canary grass are still actively growing. This seasonal timing helps to minimize off-target damage.

4.10.3 Supplemental Seeding

Supplemental seeding will likely be required during the establishment period within each Solar Array Development Area. Completing supplemental seeding does not indicate that the initial seeding was a failure. Supplemental seeding may occur during the same seeding windows as described in **Table 8**. Potential areas that are candidates for supplemental seeding include areas where localized broadcast application occurred and in areas where vegetation is sparse. Areas where supplemental seeding occurred are likely to be mapped and considered during the application of adaptive management. Repeated supplemental seedings in the same general vicinity may indicate that a change in management techniques, soil amendments, or seed mix may be required.

4.11 Long-Term Maintenance Practices (Years 6+)

In Year 6, a well-managed native seeding typical transitions from establishment to maintenance. The key feature of the transition is a decrease in the amount of time and resources dedicated to working towards achieving the desired vegetation management outcomes. By Year 6, vegetation should be positively trending towards meeting the objectives established in this Vegetation Management Plan. For the Northern Crescent Solar Project Area, this means:

- Desired vegetation succeeding in the appropriate locations throughout the Project Area.

Year 6 through the end of the Site Permit term is referred to as the maintenance period because native plant species have evolved to persist in the environment through a wide range of conditions. However, maintenance does not infer maintenance-free. Native vegetation in the Project Area represents a grass-dominated or prairie conditions. Grass-dominated plant communities and prairies are disturbance-dependent and help to maintain plant community health. Disturbances were historically provided by both wild and human-set fires, drought, and grazing herds of large herbivores. Mowing within the Solar Array Development Areas will likely be the main form of disturbance.

4.11.1 Mowing

Mowing during the long-term maintenance period varies from the establishment period in frequency and desired outcome. The desired outcome for establishment period mowing is to reduce competition. During the maintenance period it is to simulate disturbance. **Table 15** provides guidelines for mowing during the maintenance period. The mowing frequency is reduced during the maintenance period when compared to the establishment period; however, the number of mowing events in the maintenance period may increase if vegetation grows to a height that impacts solar energy capture by the arrays.

Table 15. Mowing Guidelines During Maintenance Period

Mowing Period	Mowing Height	Mowing Frequency	Mowing Triggers
Prior to May 31 and after August 1 to minimize impacts to grassland nesting birds	Finished height of 4 – 6 inches	Annually to once every 2 – 3 years	• Vegetation exceeds 30 inches, which has the potential to shade panels • Presence of woody vegetation seedlings • Accumulation of thatch and dead stems that represent a fire hazard • Vegetation that does not look healthy or vigorous. Weedy or annual species compromise greater than 40% of the total vegetation cover.

Only mowing one-third of a Solar Array Development Area every year on a rotational basis and avoiding mowing in the same area ideally for two years, but not more than consecutive years provides refugia for pollinator species. Thatch layers provide overwintering, nesting, or egg laying habitat while also providing habitat for grassland birds that prefer a range of cover densities and thatch thickness. Mowing only one-third of a management unit every year also reduces the overall maintenance budget.

The feasibility of setting aside up to two-thirds of the perennially vegetated areas each year to create refugia for pollinators and grassland birds will likely be determined several years into the maintenance period after observations have been obtained on the typical growth height within the given site conditions. Ultimately, the potential to create refuges will depend on the annual growth rate, height of the vegetation, the potential to impact solar energy captured by the arrays, or the creation of unsafe working conditions for the operations personnel. Annual vegetation monitoring will inform which management units in the Project Area are achieving the desired vegetation conditions and which require additional targeted maintenance.

Currently grazing by livestock and haying are not proposed management activities for the Project. In the event that either is considered in the future, Northern Crescent Solar will assess the current state of knowledge to determine their suitable and best management practices before implementation.

4.11.2 Woody Vegetation Control

The establishment of woody vegetation within the arrays and along fence line perimeter borders when not used for visual screening is a potential negative impact to facility infrastructure through shading of both the solar panels and native vegetation. There is a general lack of existing woody vegetation within the Project Area due to current land use. Site layout and designs seek to avoid removal of any existing woody vegetation, where present on the site, during the construction and operation of the Project. Monitoring for woody vegetation should focus on areas where trees and shrubs are present due to the proximity to a seed source; however, all areas within the Solar Array Development Areas should be checked annually and mapped when present for the establishment of woody vegetation seedlings and saplings.

Mowing will likely control most woody vegetation seedlings, if conducted annually during the establishment phase and every two to three years during the maintenance phase. Additional woody vegetation control techniques include:

- Hand cutting with brush saws and chainsaws around arrays and fence lines where mowing does not do an effective job and trees and shrubs are reaching waist height or greater. Many tree species will continue to re-sprout so herbicide may be applied to the cut stump; and,
- Spot spraying a foliar herbicide to the leaves during the growing season. This is typically an effective treatment for dense stands of small saplings that are difficult to mow and hand cut. Care will be taken to avoid overspray and off target damage to existing vegetation.

4.11.3 Herbicide Application

Similar to the establishment period, herbicide applications during the maintenance period are likely to be primarily spot spraying using low volume backpack sprayers and equipment-mounted hand sprayers. Herbicide selection and timing are similar between establishment and maintenance period. Monthly inspections throughout each entire Solar Array Development Area will identify areas for treatment. Completing multiple inspections throughout the growing season will identify species and areas needing treatment that may not have been an issue earlier in the year.

4.11.4 Supplemental Seeding

Ideally, supplemental seeding will be minimal during the maintenance phase because the vegetation should be well-established; however, annually, it is likely that due to herbicide applications, operation and maintenance activities, or changing conditions, that a small amount of supplemental seeding may be required. It is important to be prepared to supplemental seed to avoid allowing invasive species to get established in bare ground or sparsely vegetated areas. When supplemental seeding occurs, it will be mapped and documented including what seed mix was applied, reason for supplemental seeding, and proposed follow-up inspections. Supplemental seeding activities will be summarized in the annual monitoring report.

4.11.5 Agricultural Areas Included in Project Area and Planned for Future Facility Expansion

As previously discussed, agricultural production would be allowed to continue in certain areas within the Project Area but outside the fenced arrays during Project construction and operation. Northern Crescent Solar will annually inform landowners in the spring of each year of the importance of preventing pesticide drift onto native vegetation, implementing practices that protect soil health, and managing noxious and invasive plant species.

5.0 Vegetation Monitoring and Adaptive Management

5.1 During Construction

Qualified vegetation management professionals will inspect construction practices that maintain soil health including reducing impacts due to construction such as compaction, soil erosion, soil separation and storage, and stormwater runoff. A qualified vegetation management professional also will be able to identify and report weed establishment and proliferation as part of monthly vegetation inspections and annual monitoring events, which will be important to avoid weed problems that negatively impact vegetation conditions outlined in the objectives section. Annual reports will be prepared as indicated in Section 6.

5.2 Post-Construction

Post-construction monitoring will focus on collecting data that indicates when the NPDES/SWPPP construction stormwater permit may be closed out and on informing the success of establishment management activities. Specifically, the monitoring program will focus on collecting data on percent cover represented by native species (both seeded and volunteer), annual species, perennial species, and noxious/invasive species. The highest priority for vegetation management is to achieve and maintain 70 percent or greater perennial vegetation coverage to terminate the NPDES permit (Goal 1). Understanding the development of perennial cover over time and the species that comprise the vegetation cover will inform annual management activities such as re-seeding, mowing, or spot herbicide applications.

The monitoring program will include two components: monthly inspections and annual monitoring. During the growing season, monthly growing season inspections will occur throughout the Project Area. Inspections will be completed by a qualified vegetation management professional with the intent to determine the current state of vegetation and confirm/update vegetation management activities for the current growing season. Inspections will be a combination of meander surveys through Solar Array Development Arrays and as needed, observations to address troublesome areas. Inspection reports will be developed that include areas inspected, representative photos, outcomes of previous management activities, and prescriptions for future management activities. Inspection reports will be kept internally within the Northern Crescent Solar and Storage Project team; however, inspection reports will be summarized in the annual monitoring report.

Annual monitoring will consist of a timed meander survey through each Solar Array Development Area. The meander survey will be modified based on procedures in Bohnen and Galatowitsch (2016). During the time meander survey, species observed along with an estimate of cover class will be recorded. Representative photos during each meander survey will be taken and spatially linked. Each timed meander survey route will be at least 30 minutes long. The number of routes will vary based on the size of the Solar Array Development Area, but will follow guidelines in Bohnen and Galatowitsch (2016):

- One route for each Solar Array Development Area 5 acres or less.
- Two routes for each Solar Array Development Area between 5 and 59 acres in size.
- One route for every 30 acres in Solar Array Development Area between 60 and 300 acres in size.

- Ten or more routes in Solar Array Development Area 300 acres in size.

Monitoring will occur late in the growing season annually in the first five years and continue on an annual basis through the remaining period of the permit. Monitoring late in the growing season allows for an understanding of the effects of the previous and current management activities while setting the basis for the following year's work. A monitoring report will be developed and submitted to the PUC's e-docket system by January 31 of the following year.

The Project as currently proposed is not attempting to qualify for MN BWSR's "Habitat Friendly Solar" program. Monitoring protocols will focus on meeting Project objectives, which will be integrated into other monitoring and inspection activities occurring during the year and be useful to implementing the adaptive management program.

5.3 Adaptive Management

Adaptive management is the process of collecting data about the response to management actions and incorporating new information to make future decisions. An adaptive management program will consist of the following elements:

- Following annual monitoring in the first five years, if a Solar Array Development Area is not meeting its objectives, developing a work plan for a Solar Array Development Area block that includes proposed management actions to achieve the Project objectives. This could be as simple as a one-to-two-page worksheet;
- Recording management actions completed during the growing season, environmental conditions such as temperatures and rainfall, and activities that impacted vegetation; and,
- Incorporating changed management actions into Solar Array Development Area work plans in response to new information and/or techniques.

Adaptive management decisions will be informed by a qualified vegetation management professional. The impact of using an adaptive management approach will be observed based on the description of the existing site conditions in the post-construction long-term management phase. Adaptive management reports and work plans will be available to state and local authorities upon request.

6.0 Annual Reporting

An annual vegetation management report for the Project will be produced and include the information listed below:

- Summary of management objectives by Solar Array Development Area;
    - Description of existing site conditions
    - Summary of management actions taken
    - General end of year conditions following management
    - Copies of monthly vegetation inspection reports
- Description of issues, obstacles, and challenges related to vegetation management during the reporting year such as weather, staffing, operations and maintenance;
- List of anticipated management actions for the following growing season; and,
- Figures with photo points and locations of management actions.

The annual report will be submitted to PUC's e-docket by January 31 of the following year of Project operation.

7.0 References

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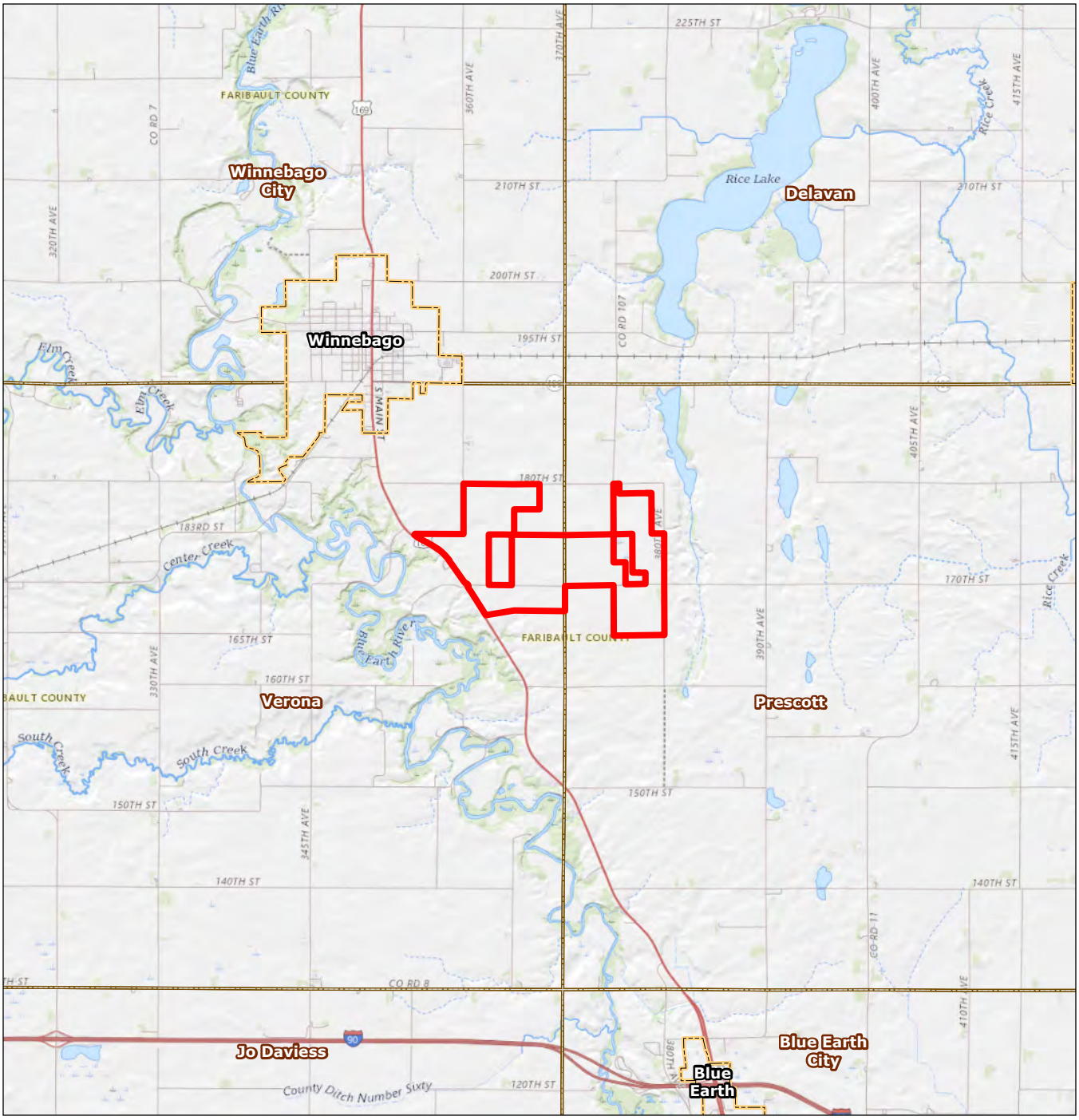
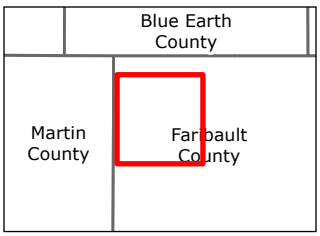
APPENDIX A

Figures





Legend
- Project Area
- City
- Township

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Stantec

Project Location
Faribault Co., MN

Prepared by ARH on 2024-02-07

Client/Project
227706727
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

Figure No.
1

Title
Site Location for Northern Crescent Solar and Storage Project

Page 1 of 1

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USGS, Stantec
3. Background: USGS 7.5 Minute Quadrangle

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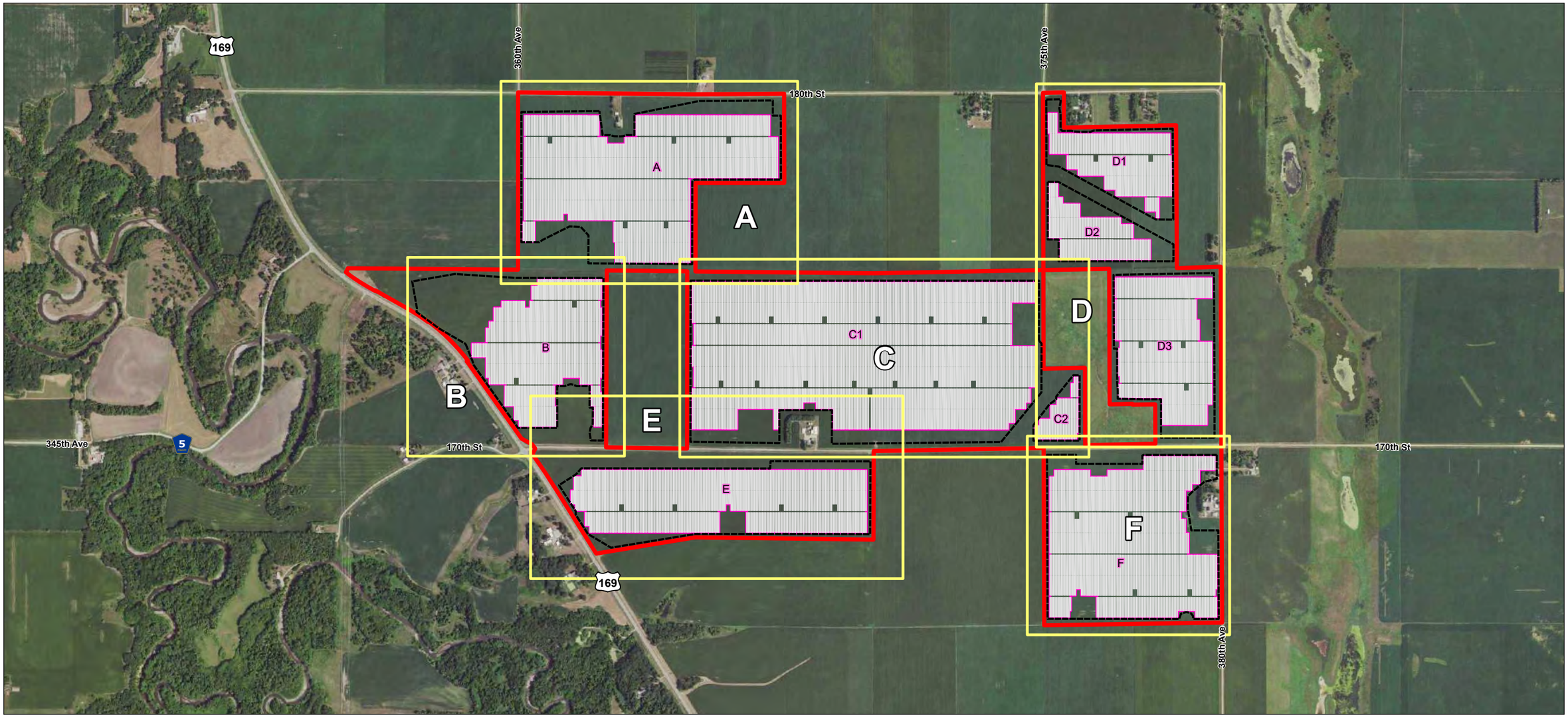

Watonwan County	Blue Earth County	Waseca County
Martin County	Faribault County	Freeborn County
	Minnesota	
	Iowa	

Legend

- Project Area
- Vegetation Management Unit
- Solar Array Development Area
- Arrays
- Security Fence

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Stantec

Project Location
Faribault Co., MN

Prepared by ARH on 2024-02-07

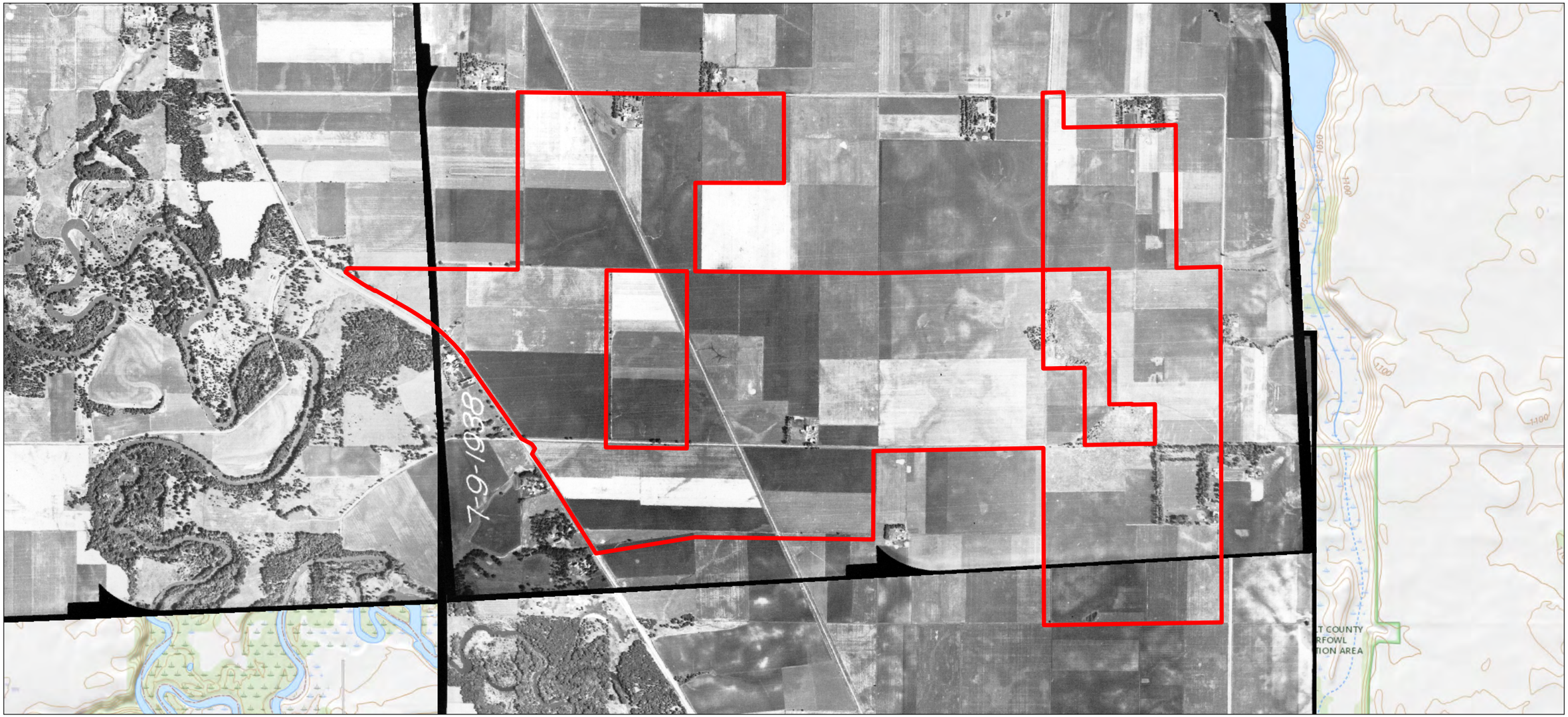
Client/Project
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

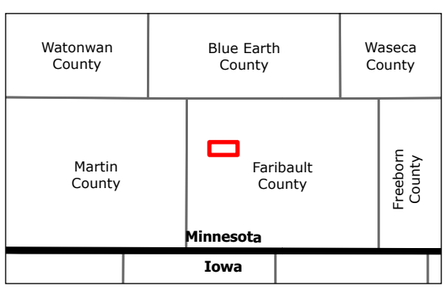
227706727

Figure No.
2

Title
Project Overview and Vegetation Management Development Areas and Vegetation Management Unit Boundaries

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial





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Project Area

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Stantec

Project Location
Faribault Co., MN

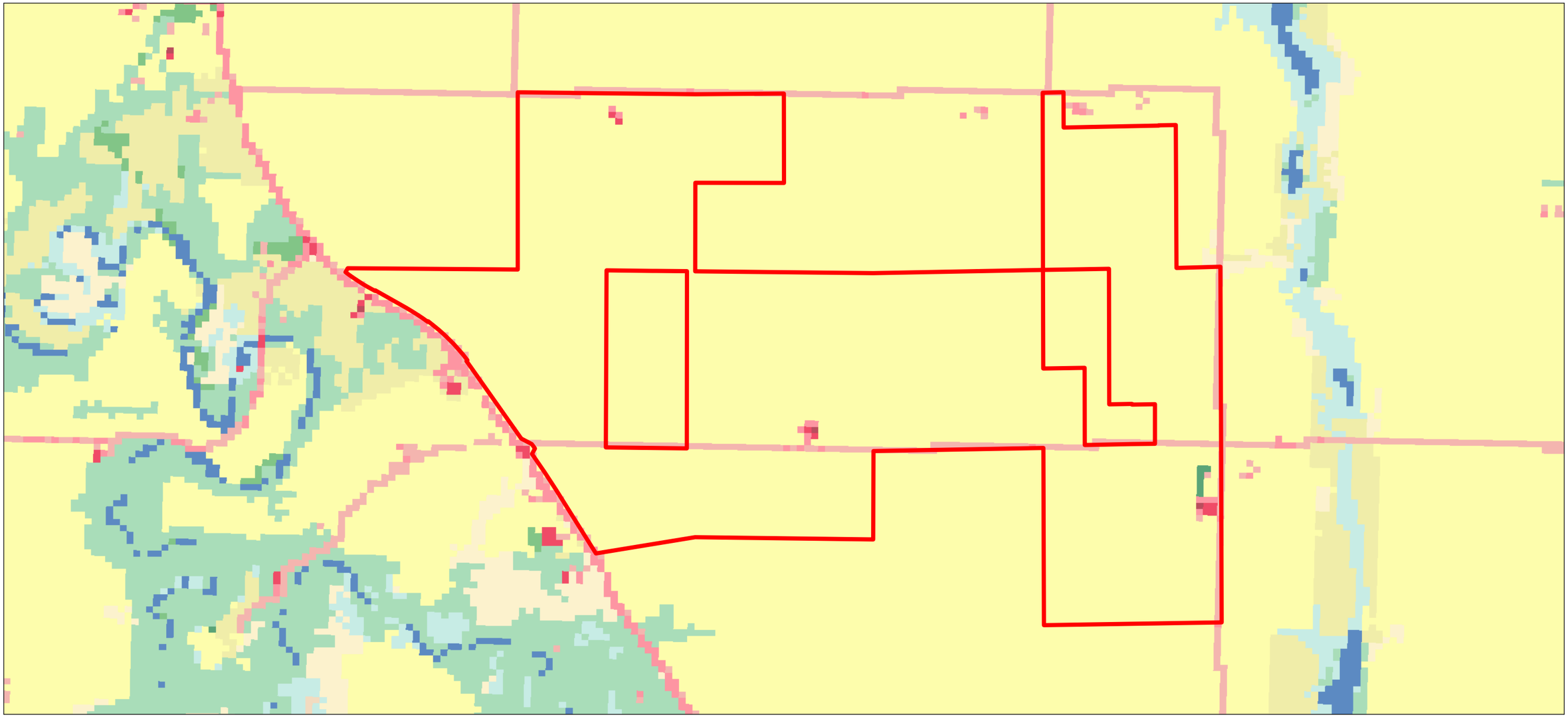
Prepared by ARH on 2024-02-07

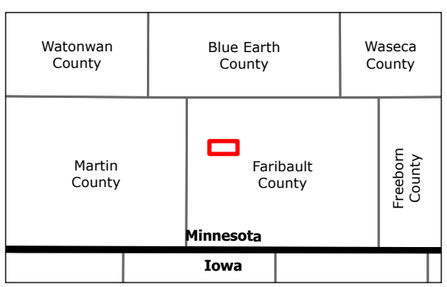
Client/Project
227706727
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

Figure No.
3

Title
Historical Area from 1938

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: UMN MHAPO
3. Background: MHAPO 1938 Aerial





Legend

- Project Area

National Land Cover Database

- Open Water
- Perennial Snow/Ice
- Developed Open Space
- Developed Low Intensity
- Developed Medium Intensity
- Developed High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Dwarf Scrub
- Shrub/Scrub
- Grassland/Herbaceous
- Sedge/Herbaceous
- Lichens
- Moss
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

0 750 1,500 Feet

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Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USA NLCD, Stantec
3. Background: NLCD 2019

Stantec

Project Location
Faribault Co., MN

Prepared by ARH on 2024-02-07

Client/Project
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

227706727

Figure No.
4

Title
Current Land Cover based on 2019 National Land Cover Dataset

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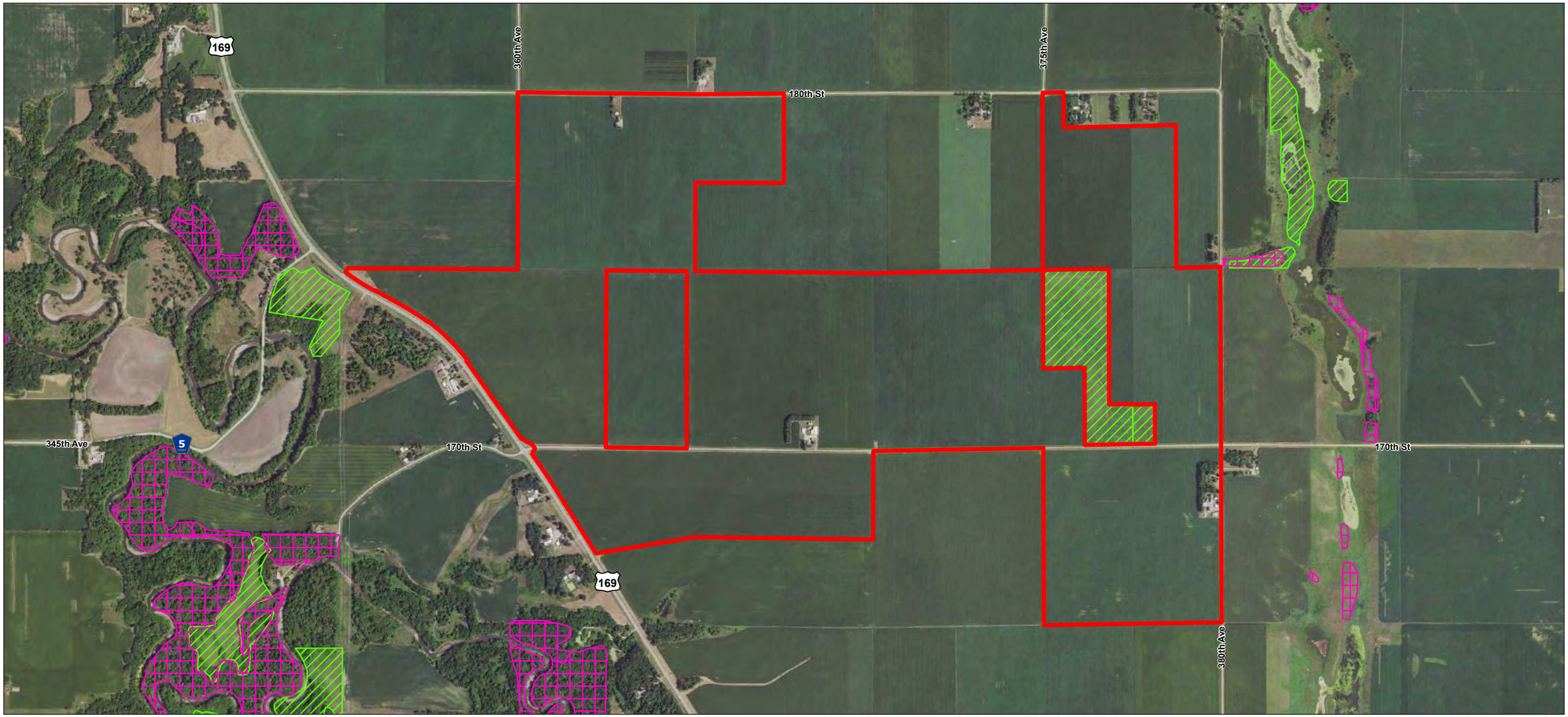

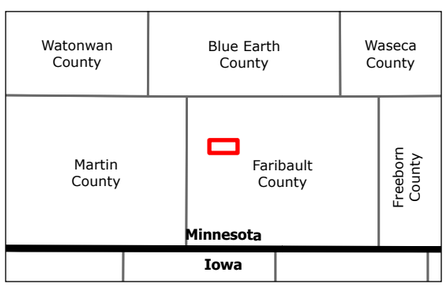

Legend

- Project Area
- DNR Native Plant Communities
- BWSR Conservation Easements (RIM Reserve)

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Notes

1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDNR, BWSR, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial

Stantec

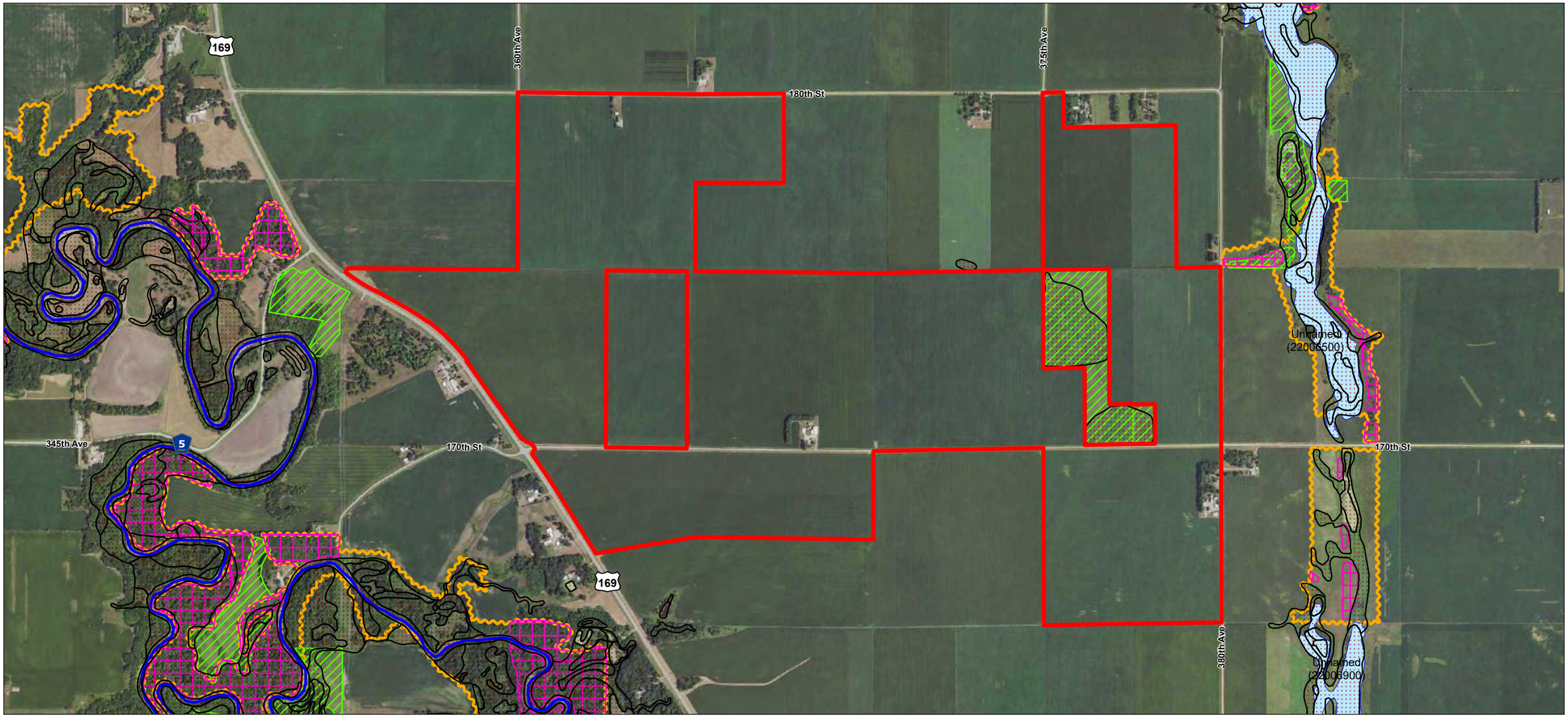
Project Location
Faribault Co., MN

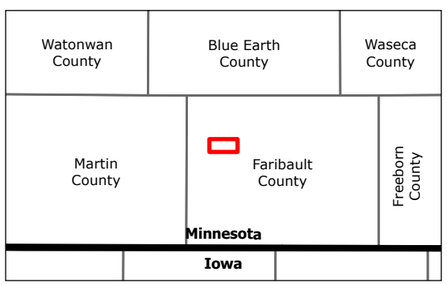
Prepared by ARH on 2024-02-07

Client/Project
227706727
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

Figure No.
5

Title
Current Land Use





Legend

- Project Area
- DNR Native Plant Communities
- BWSR Conservation Easements (RIM Reserve)
- MBS Sites of Biodiversity Significance
- USFWS National Wetland Inventory

Minnesota Public Waters Delineations

- Public Waters Basins
- Public Water Watercourse

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

Stantec

Project Location
Faribault Co., MN

Prepared by ARH on 2024-02-07

Client/Project
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

227706727

Figure No.
6

Title
Potential Areas of Ecological Importance

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, USFWS, MnDNR, BWSR, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial

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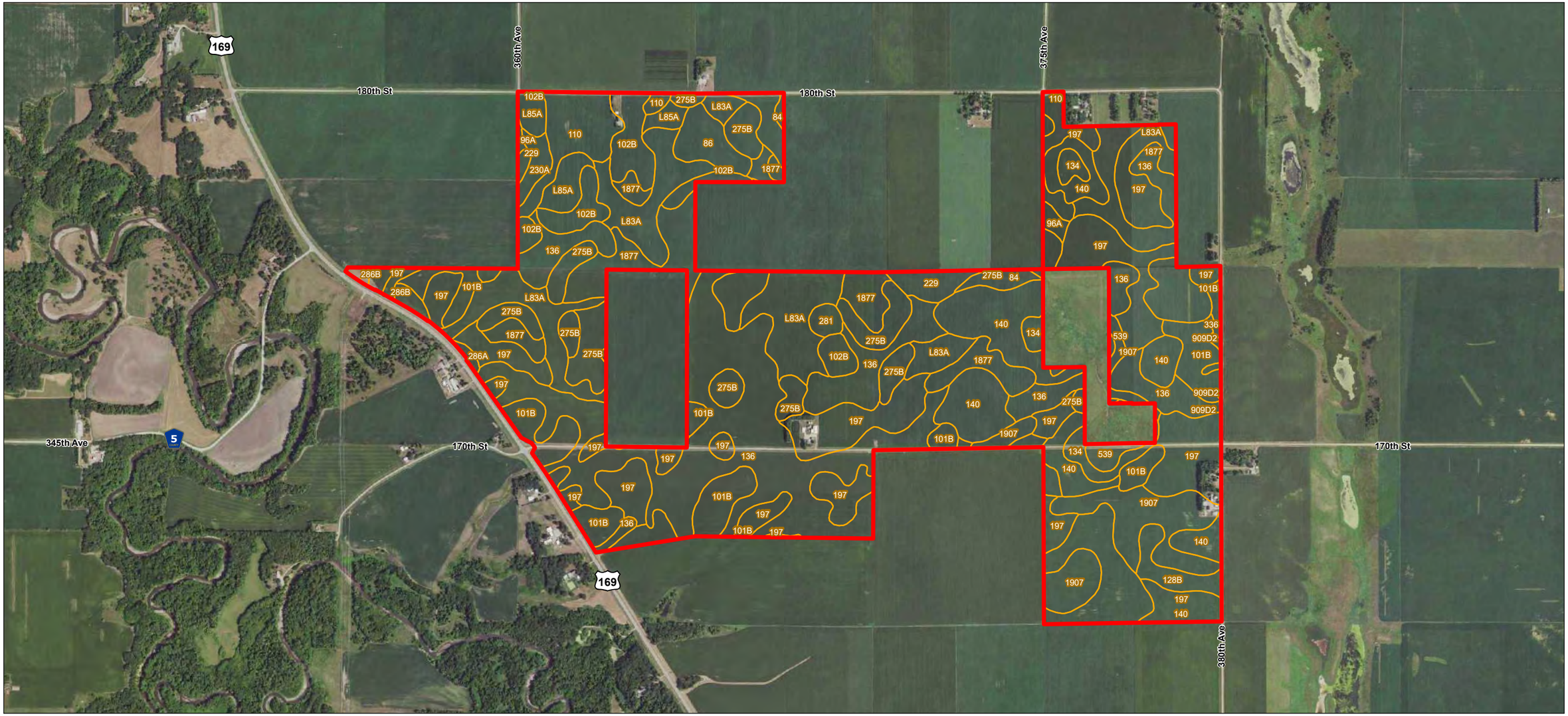

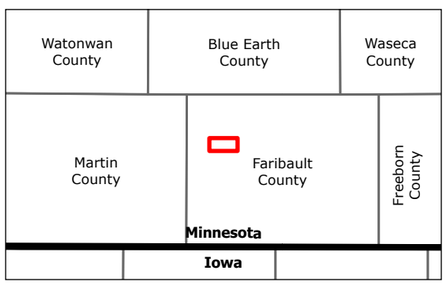

Legend

- Project Area
- Mapped Soil Units

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

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Project Location
Faribault Co., MN

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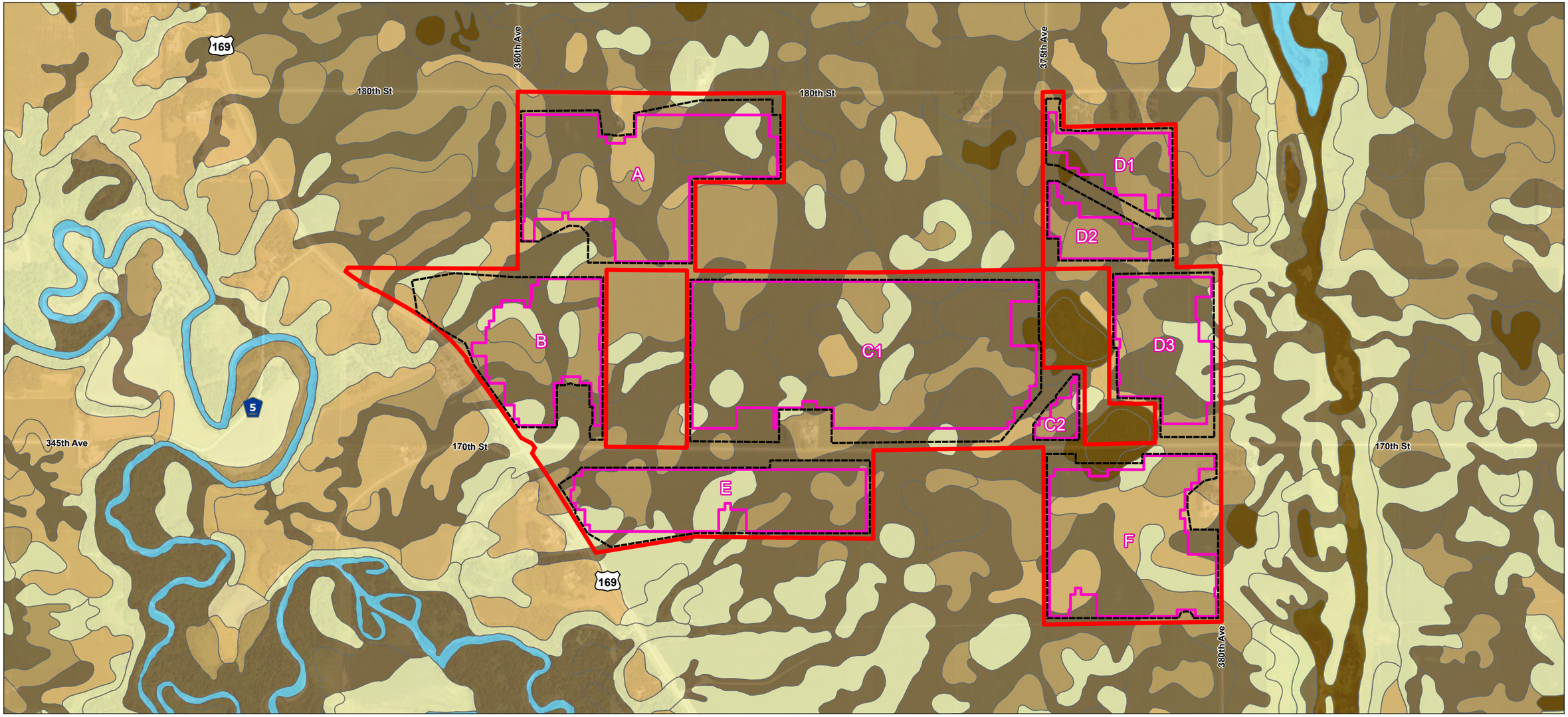
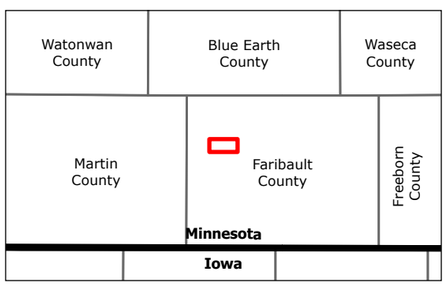
Client/Project
227706727
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

Figure No.
7

Title
Mapped Soil Units

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial





Legend

- Project Area
- Solar Array Development Area
- Security Fence

Soil Drainage Class

- Water
- Very poorly drained
- Poorly drained
- Somewhat poorly drained
- Moderately well drained
- Somewhat excessively drained
- Well drained

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

Notes

1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial

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Project Location
Faribault Co., MN

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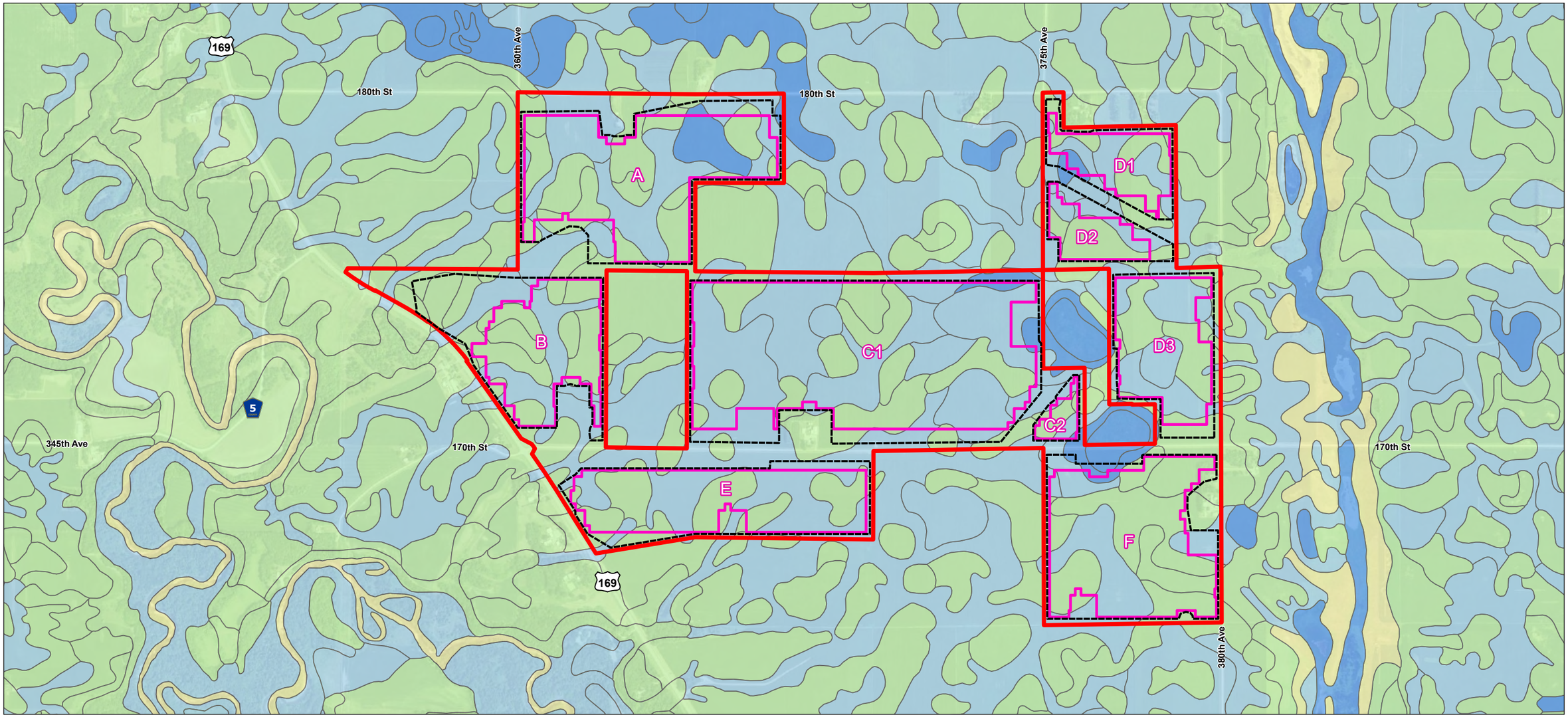
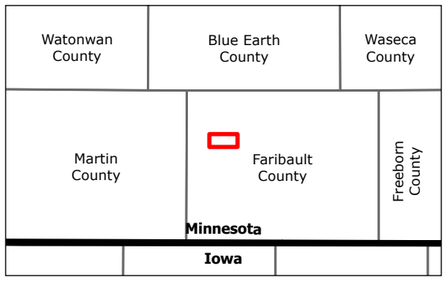
Client/Project
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

227706727

Figure No.
8

Title
Soil Drainage Class





Legend

- Project Area
- Solar Array Development Area
- Security Fence

Soil Drainage Class

- Not Hydric
- Predominantly Non-hydric
- Predominantly Hydric
- Hydric

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

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Project Location
Faribault Co., MN

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Northern Crescent Solar LLC
Vegetation and Soil Management Plan

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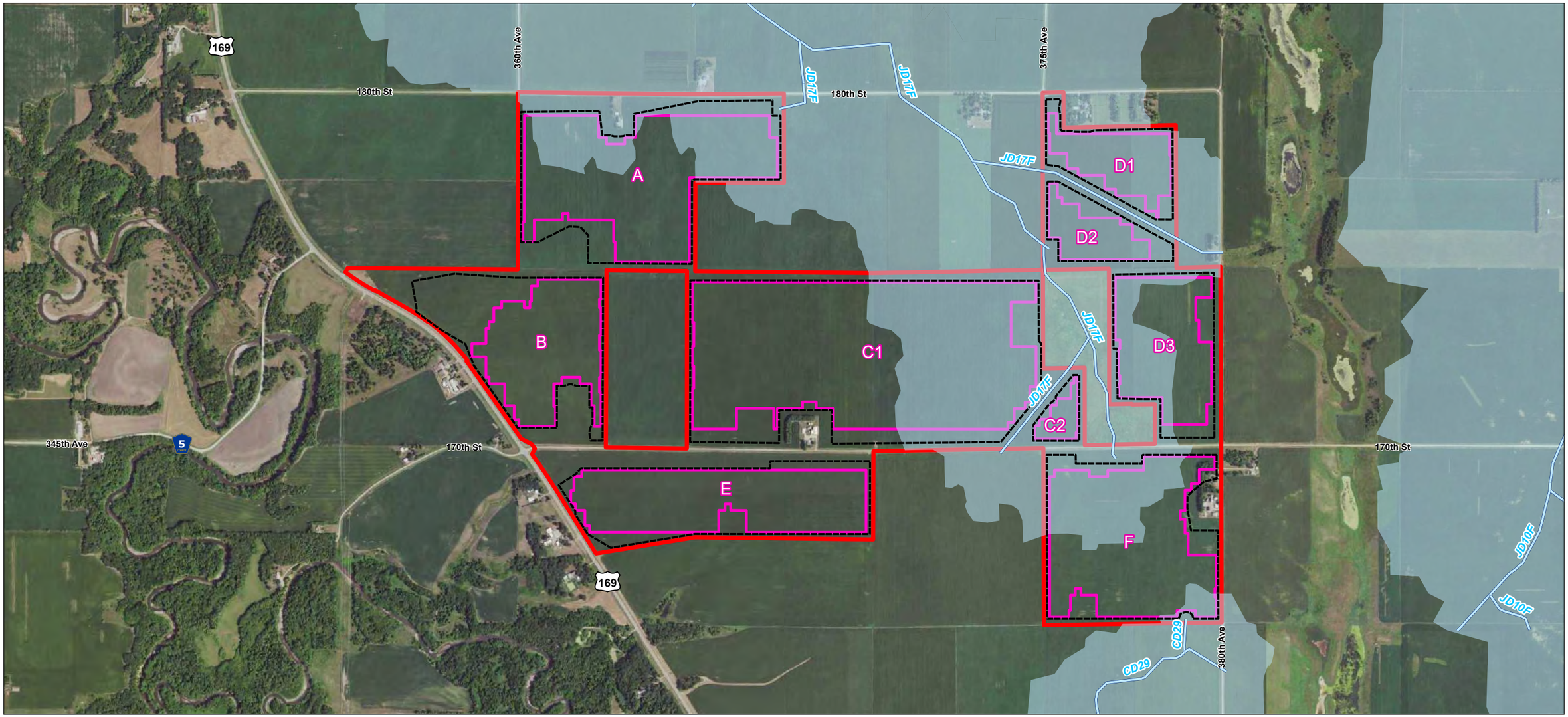
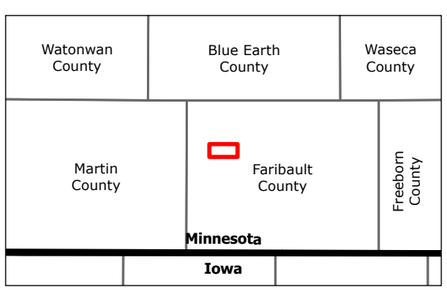
Figure No.
9

Title
Soil Hydric Rating

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Stantec
3. Background: USDA FSA 2021 Aerial





Legend

- Project Area
- Solar Array Development Area
- Security Fence
- Public Tile Centerlines
- Tile Ditchsheds

0 750 1,500 Feet

(At original document size of 11x17)
1:18,000

N

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Project Location
Faribault Co., MN

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Client/Project
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

227706727

Figure No.
10

Title
Public Drain Tiles

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Faribault Co., Stantec
3. Background: USDA FSA 2021 Aerial

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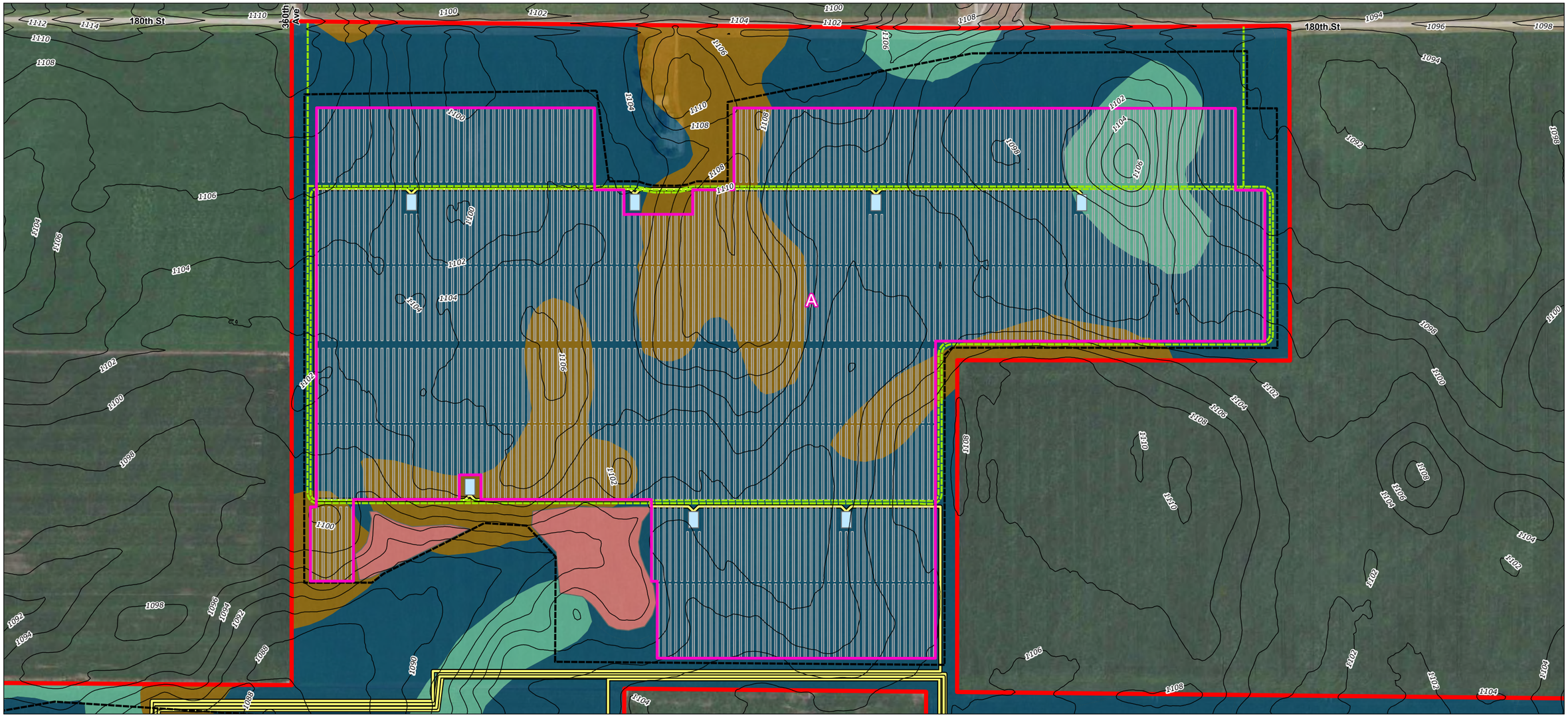

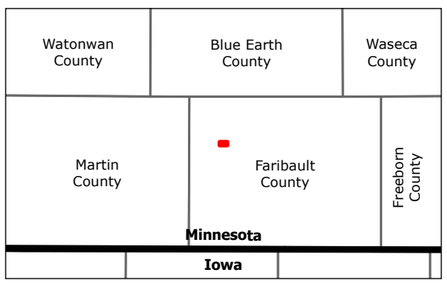

Legend

- Project Area
- Solar Array Development Area
- Arrays
- Inverters
- Security Fence
- Access Road
- Collection Line
- Contour (2ft)

Seed Mix

- Wet-Mesic Grass-Only Seed Mix
- Mesic Grass-Only Seed Mix
- Dry Grass-Only Seed Mix
- Stormwater and Detention Pond Seed Mix

0 200 400 Feet
(At original document size of 11x17)
1:4,800

N

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Project Location
Faribault Co., MN

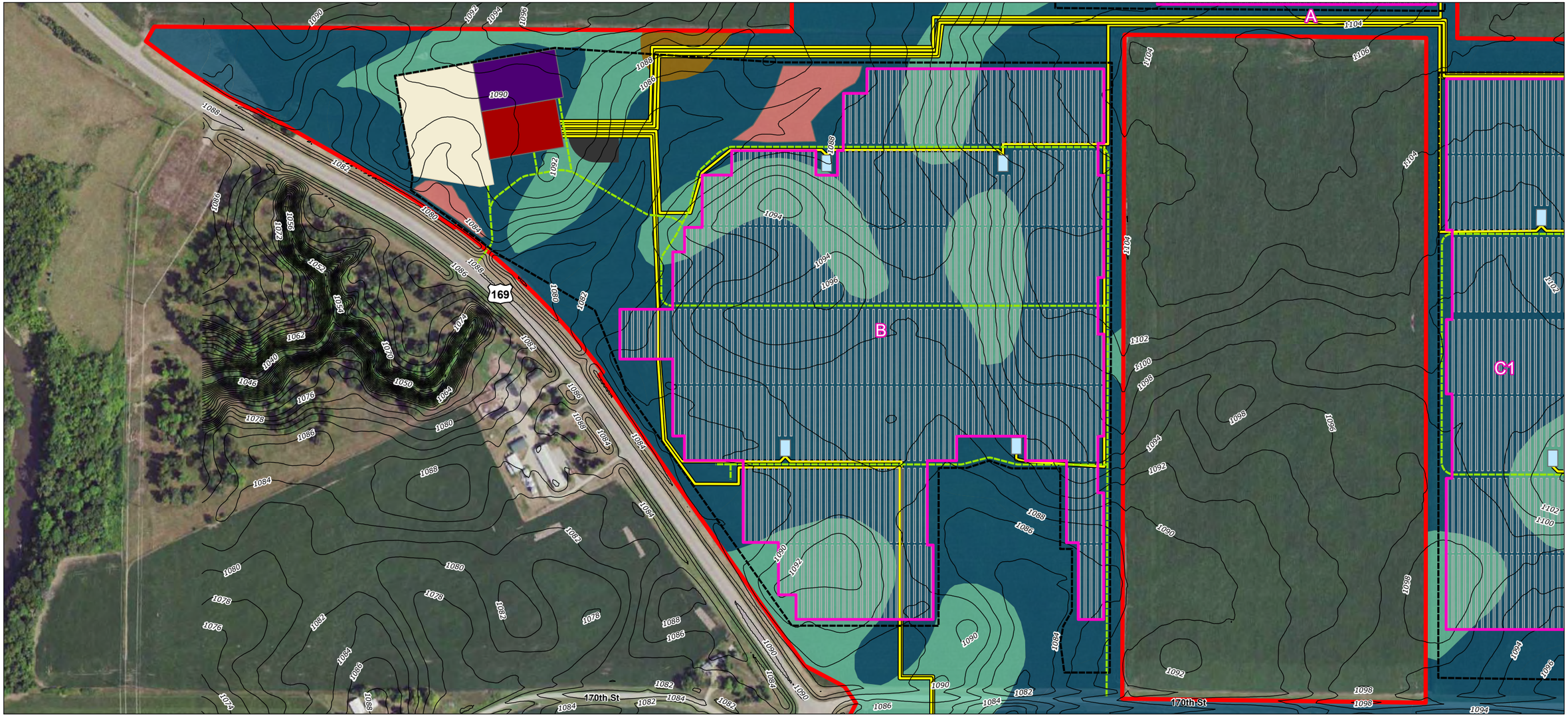
Prepared by ARH on 2024-02-08

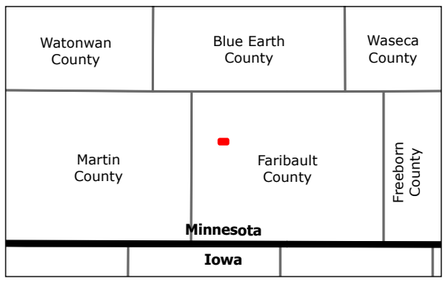
Client/Project
227706727
Northern Crescent Solar LLC
Vegetation and Soil Management Plan

Figure No.
11

Title
Solar Array Development Area A

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Faribault Co., Stantec
3. Background: USDA FSA 2021 Aerial





Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Faribault Co., Stantec
3. Background: USDA FSA 2021 Aerial

Legend

- Project Area
- Solar Array Development Area
- Arrays
- Inverters
- Security Fence
- Switchyard
- Substation
- O&M Building
- Proposed BESS
- Access Road
- Collection Line
- Contour (2ft)

Seed Mix

- Wet-Mesic Grass-Only Seed Mix
- Mesic Grass-Only Seed Mix
- Dry Grass-Only Seed Mix
- Stormwater and Detention Pond Seed Mix

0 200 400 Feet
(At original document size of 11x17)
1:4,800

N

Stantec

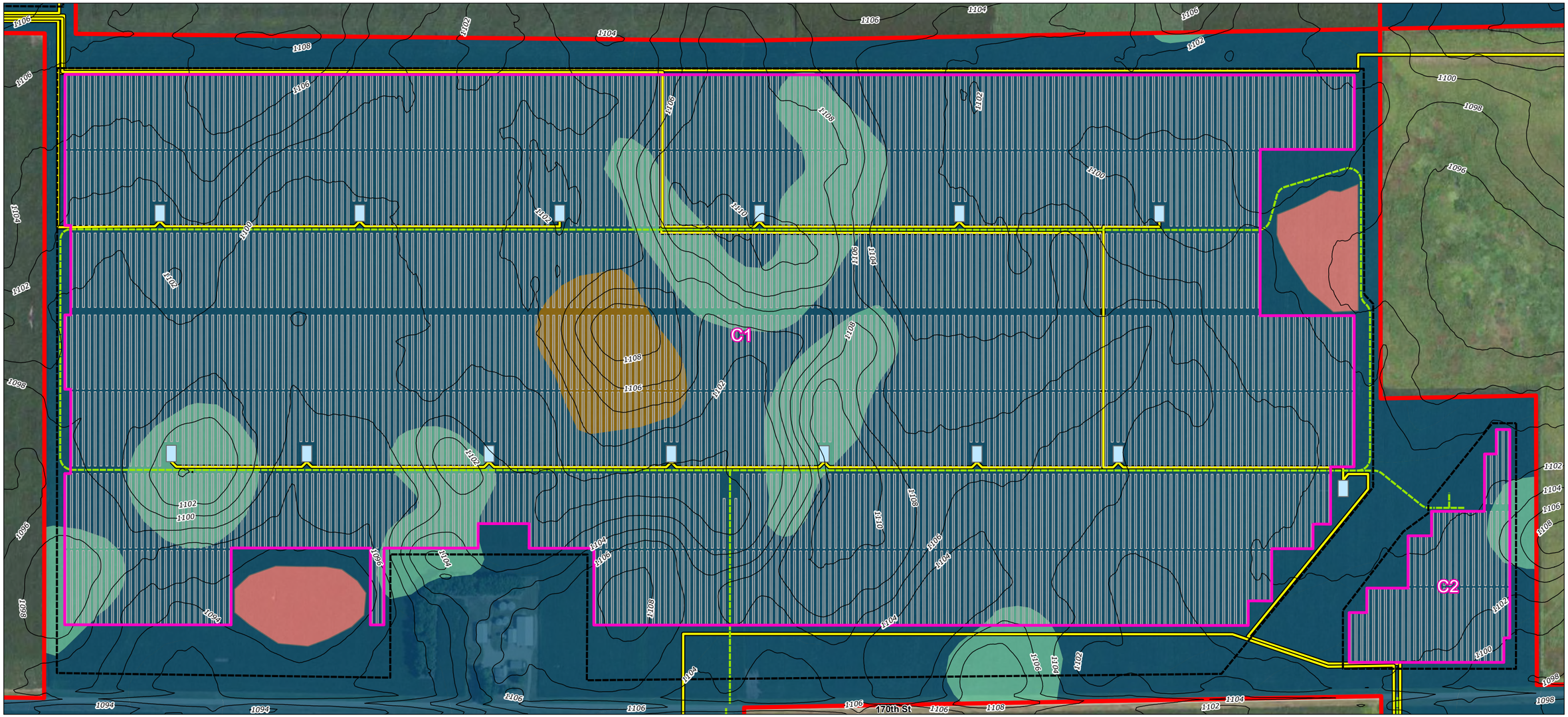
Project Location
Faribault Co., MN

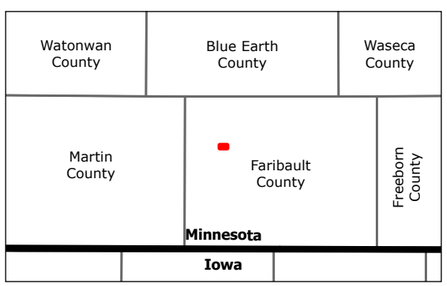
Prepared by ARH on 2024-02-08

Client/Project
227706727
Westwood Professional Services, Inc.
Northern Crescent Solar
Vegetation Management Plan

Figure No.
12

Title
Solar Array Development Area B





Legend

- Project Area
- Solar Array Development Area
- Arrays
- Inverters
- Security Fence
- Access Road
- Collection Line
- Contour (2ft)

Seed Mix

- Wet-Mesic Grass-Only Seed Mix
- Mesic Grass-Only Seed Mix
- Dry Grass-Only Seed Mix
- Stormwater and Detention Pond Seed Mix

0 200 400 Feet
(At original document size of 11x17)
1:4,800

N

Stantec

Project Location
Faribault Co., MN

Prepared by ARH on 2024-02-08

Client/Project 227706727
Westwood Professional Services, Inc.
Northern Crescent Solar
Vegetation Management Plan

Figure No.
13

Title
Solar Array Development Area C

Notes
1. Coordinate System: NAD 1983 HARN Adj MN Faribault Feet
2. Data Sources: USDA, MnDOT, Faribault Co., Stantec
3. Background: USDA FSA 2021 Aerial