

## Appendices



# **Appendix A**

## **Scoping Decision**







In the Matter of the Application of Iron Pine Solar, LLC for a Site Permit and Route Permit for the up to 325 MW Iron Pine Solar Project and 230 kV Transmission Line in Pine County, Minnesota

**ENVIRONMENTAL ASSESSMENT  
SCOPING DECISION**

**DOCKET NOS. IP-7114/GS-23-414, TL-23-415**

The above matter has come before the Commissioner of the Department of Commerce (Department) for a decision on the scope of the environmental assessment (EA) to be prepared for Iron Pine Solar, LLC's proposed 325 megawatt (MW) solar energy project and 230 kilovolt (kV) transmission line in Pine County, Minnesota.

### **Project Description**

On May 15, 2024, Iron Pine Solar Power, LLC (Iron Pine Solar) submitted a joint site and route permit application to the Minnesota Public Utilities Commission (Commission) to construct the Iron Pine Solar Project, an up to 325 MW alternating current photovoltaic solar energy generating facility and connect it to the existing electrical grid.<sup>1</sup>

The project would occupy approximately 1,537 acres in Kettle River Township, south of the town of Willow River and northeast of the town of Rutledge in Pine County, Minnesota. The project would use photovoltaic solar panels mounted on single axis tracking systems. Underground collection cables would gather and direct the electric power generated by the solar panels to a project substation. Iron Pine Solar would construct a new 230 kV transmission line and switching station to connect the project substation to the existing Minnesota Power 230 kV Arrowhead-Bear Creek transmission line, approximately one mile from the project substation.<sup>2</sup>

Construction is anticipated to begin in 2026 and operation anticipated to start in late 2027.<sup>3</sup>

### **Project Purpose**

The Iron Pine Solar Project would generate up to 325 MW of energy at the Iron Pine solar facility and deliver the power to the Midcontinent Independent System Operator (MISO). The applicant is proposing to construct this facility to sell energy, capacity, and renewable energy credits, either bundled or unbundled, to one or more electric utilities or commercial customers. Iron Pine Solar is actively marketing the project to a number of potential off-takers and may sell the power in the form of a Power Purchase Agreement, virtual power purchase agreement, or similar contract, or the project could be owned directly by a utility.<sup>4</sup>

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<sup>1</sup> Iron Pine Solar Project Joint Application to the Minnesota Public Utilities Commission for a Site Permit for a Solar Large Electric Generating Facility and a Route Permit for a High Voltage Transmission Line, May 15, 2024, eDockets Document Nos. 20245-206772-03 through 20245-206772-20; 20245-206773-01 through 20245-206773-20; 20245-206777-01 through 20245-206777-12; and 20245-206778-01 through 20245-206778-18 (Application).

<sup>2</sup> Application, Section 1.0.

<sup>3</sup> Ibid.

<sup>4</sup> Application, Section 1.1.

## Regulatory Background

Per Minnesota Statute 216E.03, no person may construct a large electric generating plant in Minnesota without a site permit from the Commission.<sup>5</sup> As proposed, the Iron Pine Solar facility would be capable of operating at up to 325 MW and would require a site permit from the Commission. Because the project is powered by solar energy, the site permit application qualifies for Commission review under the alternative permitting process described in Minnesota Statute 216E.04.<sup>6</sup>

Additionally, no person may construct a high voltage transmission line in Minnesota without a route permit from the Commission.<sup>7</sup> As proposed, the transmission line would consist of approximately one mile of new 230 kV transmission line and therefore requires a route permit from the Commission. Transmission line projects greater than 200 kV and less than 5 miles in length qualify for the alternative permitting process.<sup>8</sup>

Minnesota Statute 216B.243 precludes construction of any large energy facility without a certificate of need (CN) from by the Commission.<sup>9</sup> Solar energy generating systems proposed by an independent power producer are exempt from a CN.<sup>10</sup> Transmission lines operating at a voltage of 230 kV and less than 10 miles in length do not require a CN.<sup>11</sup> Thus, the Iron Pine Solar Project does not require a CN.

Department of Commerce, Energy Environmental Review and Analysis (EERA) staff is responsible for conducting environmental review for site permit and route permit applications submitted to the Commission.<sup>12</sup> EERA staff will prepare an environmental assessment (EA) for the project. An EA contains an overview of the resources affected by the project. It also discusses potential human and environmental impacts and possible mitigation measures. Under the alternative permitting process, an EA is the only required state environmental review document.<sup>13</sup>

## Scoping Process

Scoping is the first step in the environmental review process. The scoping process has two primary purposes: (1) to gather public input as to the impacts and mitigation measures to study in the EA and (2) to focus the EA on those impacts and mitigation measures that will aid in the Commission's decision on whether to issue a site permit and route permit for the project.

Staff use the information gathered during scoping to inform the content of the EA. EERA staff gathered input on the scope of the EA through public meetings and an associated comment period. This scoping decision identifies the impacts and mitigation measures that will be analyzed in the EA.

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<sup>5</sup> Minn. Stat. 216E.03 Subd. 1.

<sup>6</sup> Minn. Stat. 216E.04 Subd. 2 (8).

<sup>7</sup> Minn. Stat. 216E.03 Subd. 2.

<sup>8</sup> Minn. Stat. 216E.04 Subd. 2 (4).

<sup>9</sup> Minn. Stat. 216B.243 Subd. 2.

<sup>10</sup> Minn. Stat. 216B.243, Subd. 8 (7).

<sup>11</sup> Minn. Stat. 216B.2421, Subd. 2.

<sup>12</sup> Minnesota Rule 7850.3700.

<sup>13</sup> Minnesota Statute 216E.04, subd. 5; Minn. Rule 7850.3700, subp. 4.

### Public Information and Scoping Meetings

On July 24, 2024, Commission and EERA staff jointly held a public information and scoping meeting in Sandstone, Minnesota, and an on-line meeting was held on July 25, 2024.<sup>14</sup> Approximately 40 people attended the in-person public meeting and five people offered oral comments.<sup>15</sup> Three people attended the on-line meeting and one public agency requested information from the applicant.<sup>16</sup> In addition to the oral comments received at the public meetings, EERA received written comments from three persons.

At the in-person meeting on July 24, 2024:

- James LeBlanc spoke about aesthetics, construction noise, and property values.
- Nancy Banta expressed similar concerns about aesthetics, construction noise, and property values. She also noted concerns regarding public health and loss of wildlife. She questioned who would be using the electricity, what would be the effect on rates, if there would be a financial benefit to the adjacent landowners, and if the land was being leased.
- Rod Eslinger spoke about property values, heat generated from panels affecting adjacent landowners, and the weather.
- Pete Derungs asked about any hazardous materials in solar panels and the potential to affect groundwater.
- Girard Bennet, Willow River Fire Department, asked about local tax funding for the project, fire department access outside the perimeter fence, the potential for a wildfire on site to spread to town; and on-site staff availability in cases of emergency.

### Scoping Comment Letters

A comment period ending on August 7, 2024, provided the public with an opportunity to provide written comments on the scope of the EA.

The Minnesota Department of Transportation (MnDOT) submitted a comment letter<sup>17</sup> to bring attention to the following areas of concern:

- Maintaining a visual barrier along I-35 to reduce motorist visual distractions and address other important safety concerns;
- The effect of the project's vegetation removal on the performance of an existing structural snow fence;
- MnDOT's required height clearances for transmission line crossing of trunk highway and Interstate rights-of-way modify those published in the National Electric Safety Code and must be adhered to;
- Installation of electrical transmission triggers the need to protect existing structural snow fences by installing further grounding measures, as per MnDOT 2557 Standard Specification Book; and

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<sup>14</sup> Notice, eDockets Document Nos. 20247-208526-01 and 20247-208526-02.

<sup>15</sup> Public Comments, eDocket Document Nos. 20248-209565-01 and 20248-209565-02.

<sup>16</sup> Public Comments, eDocket Document Nos. 20248-209565-03 and 20248-209565-04.

<sup>17</sup> Comments, eDockets Document Nos. 20248-209326-01 and 20248-209326-02.

- Coordination with MnDOT by the applicant for a Utility Permit and other permissions will be required.

LIUNA Minnesota and North Dakota submitted a letter<sup>18</sup> requesting the EA assess the extent to which construction, operation and maintenance jobs are created or preserved by the proposed facility, including priorities recently established by the legislature:

- Employ Minnesota residents and/or individuals who permanently reside within 150 miles of the facility (“local workers” as defined in statute) vs. non-local workers;
- Provide “wages that support families” and respect “the rights of workers to organize and unionize”; and
- Support participation by residents of environmental justice areas and individuals that live in or near facility host communities.

The Minnesota Department of Natural Resources (DNR) submitted a letter<sup>19</sup> requesting the EA assess the project’s potential impacts to the following resources:

- Recreation:
  - The Willard Munger State Trail;
  - Kettle River State Water Trail; and
  - Grant-in-Aid snowmobile trails that pass through the project area, such as trail 187 that runs north to south within the west side of the project area.
- Wildlife, Habitat, and Rare Species:
  - Wild and Scenic River considerations, as the project is adjacent to the Kettle River Wild and Scenic River District;
  - Protection of Wood and Blanding’s turtles, with particular attention to fencing;
  - Protection of State-threatened mussels, including preparation of an avoidance plan, if the project impacts the Kettle River;
  - Bird collision and mortality from concentrated solar thermal devices and collision with transmission lines; and
  - Vegetation management plan, as it relates to chemicals, fertilizers, pollinators, mowing, grazing livestock, and planting of native seed mixes.

### Applicant’s Response to Public Comments

On August 7, 2024, Iron Pine Solar responded to comments received prior to August 5, and submitted reply comments on August 14, 2024.<sup>20</sup> Iron Pine Solar provided two project updates:

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<sup>18</sup> Comments, eDockets Document Nos. 20248-209335-01 and 20248-209335-02.

<sup>19</sup> Comments, eDockets Document Nos. 20248-209338-01 and 20248-209338-02.

<sup>20</sup> Iron Pine Comments and Reply Comments, eDocket Nos. 20248-209331-01, 20248-209331-02, 20248-209484-01, and 20248-209484-02.

1. The MISO interconnection process is experiencing delays. Iron Pine Solar is continuing to evaluate the impact of MISO delays on the anticipated timeframe for execution of a Generator Interconnection Agreement. As part of that evaluation, Iron Pine Solar is analyzing battery storage at the point of interconnection. Adding battery storage to the project scope may require additional permits and approvals for the facility.
2. Iron Pine Solar determined that there is a narrow parcel of tax forfeit land between the road right-of-way and a participating parcel that is crossed by the proposed 230 kV transmission line for which Iron Pine Solar did not previously have an easement or other land rights. Iron Pine Solar is coordinating with Pine County to obtain the rights needed for the transmission line crossing of this parcel.

In addition, Iron Pine Solar provided responses to verbal comments made at the public meetings and to written public comments received:

- Iron Pine Solar does not object to the following being studied in the EA:
  - Effects to recreational trails in the area;
  - Maintaining existing vegetation between the project and the I-35 right-of-way; and
  - Considerations identified by LIUNA.
- Iron Pine Solar committed to ongoing coordination with:
  - Neighboring landowners regarding potential visual impacts and construction impacts;
  - Local authorities regarding emergency response;
  - The Northern Pine Riders, the club responsible for maintaining the snowmobile trail MDNR referenced, to re-route the existing snowmobile trail;
  - With MDNR, regarding protected species;
  - The appropriate wildlife agencies to identify locations where marking devices, including avian flight diverters, may be installed; and
  - With MnDOT to minimize the project's impact on blowing snow.
- Iron Pine Solar referenced their joint application regarding the following items:
  - The implementation and maintenance of effective erosion and sediment control measures to protect downstream water quality, including the Kettle River.
  - The project's Vegetation Management Plan includes pollinator-friendly vegetation management practices.

Iron Pine Solar also clarified the project would use photovoltaic modules and would not use concentrated solar thermal devices.

### Commission Review

After close of the public comment period, EERA staff provided a letter to the Commission stating no alternative sites were identified for the Iron Pine Solar facility nor alternative routes for the associated

230 kV transmission line.<sup>21</sup> On August 27, 2024, the Commission authorized EERA to include in the scoping decision for the EA solely the site and route for the project identified by Iron Pine Solar.<sup>22</sup>

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**HAVING REVIEWED THE MATTER**, consulted with EERA staff, and in accordance with Minnesota Rule 7850.3700, I hereby make the following scoping decision:

## **MATTERS TO BE ADDRESSED**

The EA will describe the project and the human and environmental resources of the project area. It will provide information on the potential impacts of the project as they relate to the topics outlined in this scoping decision and possible mitigation measures. It will identify impacts that cannot be avoided and irretrievable commitments of resources, as well as permits from other government entities that may be required for the project. The EA will discuss the relative merits of the proposed project with respect to the siting and routing factors in Minnesota Rule 7850.4100.

The topics listed below will be analyzed in the EA for the project. This outline is not intended to serve as a table of contents for the document itself.

### **I. GENERAL DESCRIPTION OF THE PROJECT**

- A. Project Description
- B. Project Purpose
- C. Project Costs

### **II. REGULATORY FRAMEWORK**

- A. Site Permit
- B. Route Permit
- C. Environmental Review Process
- D. Other Permits and Approvals

### **III. ENGINEERING, DESIGN, AND CONSTRUCTION**

- A. Solar Arrays
- B. Electrical Collection Systems
- C. Substation
- D. Transmission Structures
- E. Switching Station
- F. Construction
- G. Restoration

### **IV. OPERATION AND DECOMMISSIONING**

- A. Maintenance
- B. Vegetation Management

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<sup>21</sup> Letter, eDockets Document No. 20248-209570-01 and 20248-209570-02.

<sup>22</sup> Order, eDockets Document No. 20248-209792-01, 20248-209792-02.

C. Repowering and Decommissioning

**V. AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATIVE MEASURES**

The EA will include a discussion of the human and environmental resources potentially impacted by the project. Potential impacts of the project will be described and characterized. Based on the impacts identified, the EA will describe mitigation measures that could reasonably be implemented to reduce or eliminate the identified impacts. The EA will describe any unavoidable impacts resulting from implementation of the project.

Data and analyses will be commensurate with the level of impact for a given resource and the relevance of the information to consider mitigation measures. EERA staff will consider the relationship between the cost of data and analyses and the relevance and importance of the information in determining the level of detail of information to be prepared for the EA. Less important material may be summarized, consolidated, or simply referenced.

If relevant information cannot be obtained within timelines prescribed by statute and rule, the costs of obtaining such information is excessive, or the means to obtain it is unknown, EERA staff will include in the EA a statement that such information is incomplete or unavailable and the relevance of the information in evaluating potential impacts or mitigation.

- A. Environmental Setting
- B. Human Settlement
  - 1. Noise
  - 2. Aesthetics
  - 3. Displacement
  - 4. Property Values
  - 5. Zoning and Land Use Compatibility
  - 6. Cultural Values
  - 7. Transportation and Public Services
    - a) Snow Fences
- C. Socioeconomics
  - 1. Environmental Justice
  - 2. Local Economies
- D. Public Health and Safety
  - 1. Electric and Magnetic Fields
  - 2. Emergency Services
- E. Land Based Economies
  - 1. Agriculture
  - 2. Forestry
  - 3. Mining
  - 4. Recreation and Tourism
    - a) State Recreation Trails
- F. Archaeological and Historic Resources
- G. Natural Environment
  - 1. Water Resources
  - 2. Wild and Scenic Rivers
  - 3. Soils

4. Geology
  5. Wildlife
  6. Air Quality
  7. Climate Change / Climate Resiliency
  8. Threatened / Endangered / Rare and Unique Natural Resources
- H. Adverse Impacts that Cannot be Avoided
- I. Irreversible and Irretrievable Commitments of Resources

## ISSUES OUTSIDE THE SCOPE OF THE EA

The EA will not address the following topics:

- Any site or route other than the project site and route proposed by the applicant.
- Any system alternative (an alternative to the proposed generation or transmission component).
- Potential impacts of specific energy sources.
- The manner in which landowners are compensated for the project.

## SCHEDULE

The EA is anticipated to be completed and available in January 2025. Upon completion, it will be noticed and made available for review. Public hearings will be noticed and held in the project area after issuance of the EA. Comments on the EA may be submitted into the hearing record.

Signed this 3rd day of September, 2024

STATE OF MINNESOTA  
DEPARTMENT OF COMMERCE

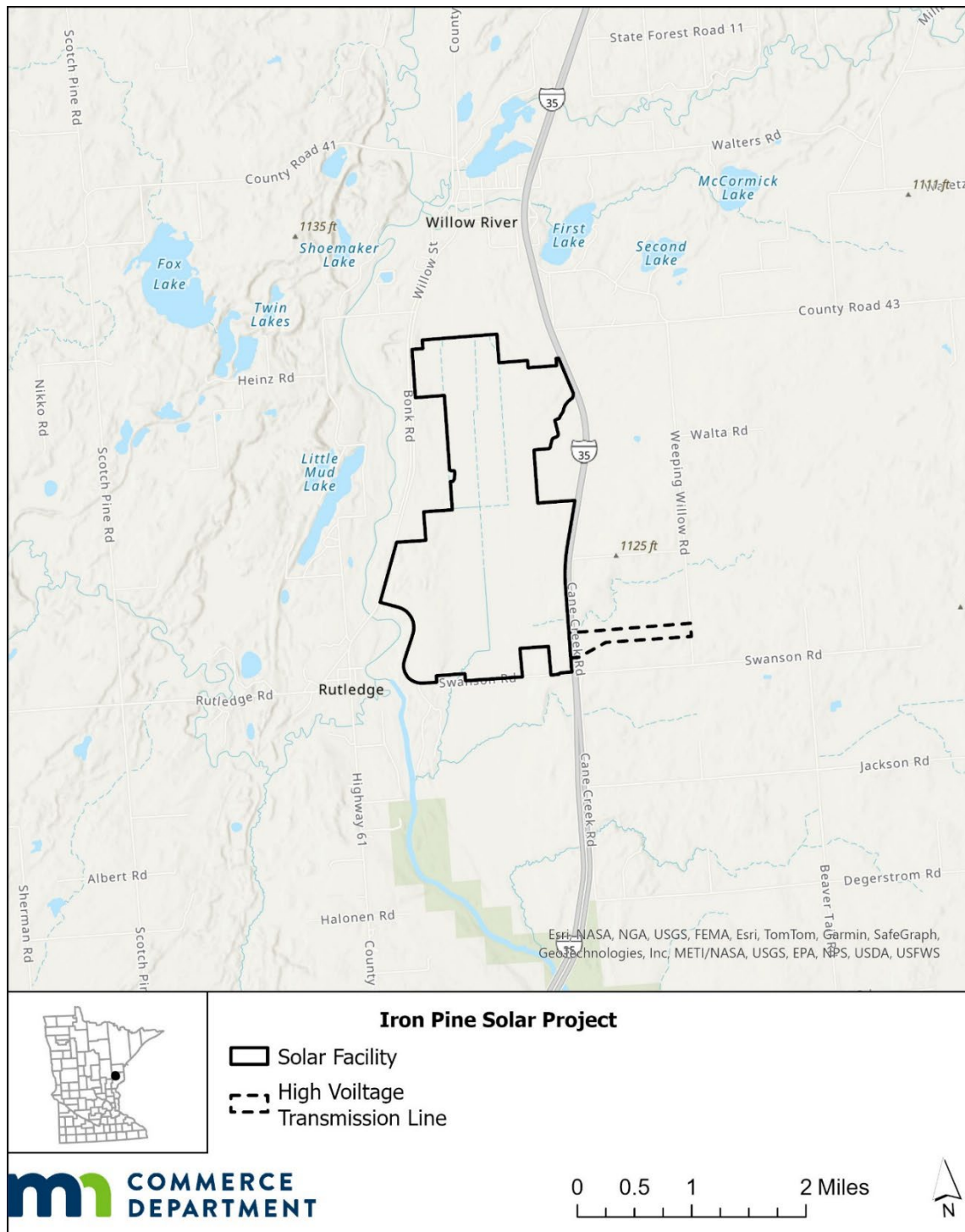


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Pete Wyckoff, Assistant Commissioner



Iron Pine Solar Project Overview Map



## **Appendix B**

### **Draft Site Permit**



STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

SITE PERMIT FOR

~~[PROJECT NAME]~~ IRON PINE SOLAR PROJECT

A SOLAR ENERGY GENERATING SYSTEM

IN

~~[COUNTY]~~ PINE COUNTY

ISSUED TO

~~[PERMITTEE]~~ IRON PINE SOLAR POWER, LLC

PUC DOCKET NO. ~~[Docket Number]~~ IP-7114/GS-23-414

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850 this site permit is hereby issued to:

~~[Permittee]~~ IRON PINE SOLAR POWER, LLC

~~[Permittee]~~ Iron Pine Solar Power, LLC is authorized by this site permit to construct and operate ~~[Provide a description of the project authorized by the Minnesota Public Utilities Commission]~~ the Iron Pine Solar Project, an up to 325 megawatt solar energy generating system in Pine County, Minnesota.

The solar energy generating system shall be constructed and operated within the site identified in this site permit and in compliance with the conditions specified in this site permit.

This site permit shall expire ~~[xx]~~ 30 years from the date of this approval.

Approved and adopted this \_\_\_\_ day of [Month, Year]

BY ORDER OF THE COMMISSION

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Will Seuffert,  
Executive Secretary

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## **ATTACHMENTS**

Attachment 1 – Complaint Handling Procedures for Permitted Energy Facilities

Attachment 2 – Compliance Filing Procedures for Permitted Energy Facilities

Attachment 3 – Site Permit Maps

## 1 SITE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this site permit to ~~[Permittee Name]~~ Iron Pine Solar Power, LLC (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This site permit authorizes the Permittee to construct and operate ~~a [Provide a description of the project as authorized by the Commission]~~ an up to 325 megawatt solar energy generating system in Pine County (~~[Project Name, if applicable]~~ Iron Pine Solar Project, henceforth known as Project). The solar energy generating system shall be constructed and operated within the site identified in this site permit and in compliance with the conditions specified in this site permit.

### 1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this site permit shall be the sole site approval required for the location, construction, and operation of the solar energy generating system and this site permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose governments.

## 2 PROJECT DESCRIPTION

~~[Provide a description of the Project as authorized by the Commission]~~ The Project is an up to 325 megawatt solar energy generating facility to be located on approximately 2,207 acres in Kettle River Township in Pine County, Minnesota. The solar energy generating system will utilize approximately 1,537 acres. The primary components of the solar electric generating system include photovoltaic panels affixed to a linear ground-mounted, single-axis tracking system, solar inverters, a belowground electrical collection system, security fencing, access roads, up to 12 weather stations, and a 34.5/230 kilovolt substation. The substation will include two 230 kV circuit breakers, two 34.5 kV/230 kV generator step-up transformers, relays, and telecommunication and metering equipment.

The Project is located in the following:

County	Township Name	Township	Range	Section
<u>Pine</u>	<u>Kettle River</u>	<u>44</u>	<u>20</u>	<u>13, 14, 15, 22, 23, 24, 26, and 27</u>

### 2.1 Project Ownership

At least 14 days prior to the pre-construction meeting, the Permittee shall file a description of its ownership structure, identifying, as applicable:



- (a) the owner(s) of the financial and governance interests of the Permittee;
- (b) the owner(s) of the majority financial and governance interests of the Permittee's owners; and
- (c) the Permittee's ultimate parent entity (meaning the entity which is not controlled by any other entity).

The Permittee shall notify the Commission of:

- (a) a change in the owner(s) of the majority\* financial or governance interests in the Permittee; or
- (b) a change in the owner(s) of the majority\* financial or governance interests of the Permittee's owners; or
- (c) a sale which changes the ultimate parent entity of the Permittee

\* When there are only co-equal 50/50 percent interests, any change shall be considered a change in majority interest.

Also, in the event of an ownership change, the new Permittee must provide the Commission with a certification that it has read, understands and is able to comply with the conditions of this permit.

### **3 DESIGNATED SITE**

The site designated by the Commission for the Project is depicted on the site maps attached to this site permit (Designated Site). The site maps show the approximate location of photovoltaic tracker rows and associated facilities within the Designated Site and identify a layout that seeks to minimize the overall potential human and environmental impacts of the Project, as they were evaluated in the permitting process.

The Designated Site serves to provide the Permittee with the flexibility to make minor adjustments to the layout to accommodate requests by landowners, local government units, federal and state agency requirements, and unforeseen conditions encountered during the detailed engineering and design process. Any modification to the location of a photovoltaic tracker row or associated facility shall be done in such a manner as to have human and environmental impacts that are comparable to those associated with the layouts on the maps attached to this site permit. The Permittee shall identify any modifications in the Site Plan pursuant to Section 8.3.

### **4 GENERAL CONDITIONS**

The Permittee shall comply with the following conditions during construction and operation of the solar energy generating system over the life of this site permit.

#### **4.1 Site Permit Distribution**

Within 30 days of issuance of this site permit, the Permittee shall provide all affected landowners with a copy of this site permit and the complaint procedures. An affected landowner is any landowner or designee that is within or adjacent to the permitted site. In no case shall a landowner receive this site permit and complaint procedures less than five days prior to the start of construction on their property. The Permittee shall also provide a copy of this site permit and the complaint procedures to the applicable regional development commissions, county environmental offices, and city and township clerks. The Permittee shall file with the Commission an affidavit of its site permit and complaint procedures distribution within 30 days of issuance of this site permit.

#### **4.2 Access to Property**

The Permittee shall notify landowners prior to entering or conducting maintenance within their property, unless otherwise negotiated with the landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of Minnesota Department of Commerce (Department of Commerce) staff or Commission staff.

#### **4.3 Construction and Operation Practices**

The Permittee shall comply with the construction practices, operation and maintenance practices, and material specifications described in the permitting record for this Project unless this site permit establishes a different requirement in which case this site permit shall prevail.

##### **4.3.1 Field Representative**

The Permittee shall designate a field representative responsible for overseeing compliance with the conditions of this site permit during construction of the Project. This person shall be accessible by telephone or other means during normal business hours throughout site preparation, construction, cleanup, and restoration.

The Permittee shall file with the Commission the name, address, email, phone number, and emergency phone number of the field representative at least 14 days prior to the pre-construction meeting. The Permittee shall provide the field representative's contact information to affected landowners, local government units and other interested persons at least 14 days prior to the pre-construction meeting. The Permittee may change the field representative at any time upon notice to the Commission, affected landowners, local

government units and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its field representative's contact information at least 14 days prior to the pre-construction meeting and upon changes to the field representative.

#### **4.3.2 Site Manager**

The Permittee shall designate a site manager responsible for overseeing compliance with the conditions of this site permit during the commercial operation and decommissioning phases of the Project. This person shall be accessible by telephone or other means during normal business hours for the life of this site permit.

The Permittee shall file the name, address, email, phone number, and emergency phone number of the site manager with the Commission within 14 days prior to the pre-operation meeting. The Permittee shall provide the site manager's contact information to landowners within or adjacent to the Project Boundary, local government units and other interested persons at least 14 days prior to the pre-operation meeting. The Permittee may change the site manager at any time upon notice to the Commission, landowners within or adjacent to the Project Boundary, local government units, and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its site manager's contact information at least 14 days prior to the pre-operation meeting and upon changes to the site manager.

#### **4.3.3 Employee Training - Site Permit Terms and Conditions**

The Permittee shall train and educate all employees, contractors, and other persons involved in the construction and ongoing operation of the solar energy generating system of the terms and conditions of this site permit. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.4 Independent Third-Party Monitoring**

Prior to any construction, the Permittee shall propose a scope of work and identify an independent third-party monitor to conduct Project construction monitoring on behalf of the Department of Commerce. The scope of work shall be developed in consultation with and approved by the Department of Commerce. This third-party monitor will report directly to and will be under the control of the Department of Commerce with costs borne by the Permittee. Department of Commerce staff shall keep records of compliance with this section and will ensure that status reports detailing the construction monitoring are filed with the Commission in accordance with scope of work approved by the Department of Commerce.

#### **4.3.5 Public Services, Public Utilities, and Existing Easements**

During Project construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these shall be temporary, and the Permittee shall restore service promptly. Where any impacts to utilities have the potential to occur the Permittee shall work with both landowners and local entities to determine the most appropriate mitigation measures if not already considered as part of this site permit.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.6 Temporary Workspace**

The Permittee shall select temporary workspace and equipment staging areas that limit the removal and impacts to vegetation. The Permittee shall not site temporary workspace in wetlands or native prairie as defined in sections 4.3.13 and 4.3.14. The Permittee shall site temporary workspace to comply with standards for development of the shorelands of public waters as defined in Section 4.3.13. The Permittee shall obtain temporary easements outside of the authorized Project Boundary from affected landowners through rental agreements. Temporary easements are not provided for in this site permit.

#### **4.3.7 Noise**

The Permittee shall comply with noise standards established under Minn. R. 7030.0010 to 7030.0080, at all times and at all appropriate locations during operation of the Project. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable.

#### **4.3.8 Aesthetics**

The Permittee shall consider input pertaining to visual impacts from landowners and the local unit of government having direct zoning authority over the area in which the Project is located. The Permittee shall use care to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the Project during construction and operation.

#### **4.3.9 Topsoil Protection**

The Permittee shall implement measures to protect and segregate topsoil from subsoil on all lands utilized for Project construction unless otherwise negotiated with affected landowner.

#### **4.3.10 Soil Compaction**

The Permittee shall implement measures to minimize soil compaction of all lands during all phases of the Project's life and shall confine compaction to as small an area as feasible. The Permittee shall use soil decompaction measures on all lands utilized for Project construction and travelled on by heavy equipment (*e.g.*, cranes and heavy trucks), even when soil compaction minimization measures are used.

#### **4.3.11 Soil Erosion and Sediment Control**

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency (MPCA) Construction Stormwater Program. If construction of the Project disturbs more than one acre of land or is sited in an area designated by the MPCA as having potential for impacts to water resources, the Permittee shall obtain a National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit from the MPCA that provides for the development of a Stormwater Pollution Prevention Plan that describes methods to control erosion and runoff.

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking. Contours shall be graded as required so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. All areas disturbed during construction of the Project shall be returned to pre-construction conditions.

#### **4.3.12 Public Lands**

In no case shall photovoltaic tracker rows and associated facilities including foundations, access roads, underground cable, and transformers, be located in the public lands identified in Minn. R. 7850.4400, subp. 1, or in federal waterfowl production areas. Photovoltaic tracker rows and associated facilities shall not be located in the public lands identified in Minn. R. 7850.4400, subp. 3, unless there is no feasible and prudent alternative.

#### **4.3.13 Wetlands and Water Resources**

The Permittee shall not place the solar energy generating system or associated facilities in public waters and public waters wetlands, as shown on the public water inventory maps prescribed by Minnesota Statutes Chapter 103G, except that electric collector or feeder lines

may cross or be placed in public waters or public waters wetlands subject to permits and approvals by the Minnesota Department of Natural Resources (DNR) and the United States Army Corps of Engineers (USACE), and local units of government as implementers of the Minnesota Wetlands Conservation Act. The Permittee shall locate the solar energy generating system and associated facilities in compliance with the standards for development of the shorelands of public waters as identified in Minn. R. 6120.3300, and as adopted, Minn. R. 6120.2800, unless there is no feasible and prudent alternative.

The Permittee shall construct in wetland areas during frozen ground conditions, to the extent feasible, to minimize impacts. When construction during winter is not possible, wooden or composite mats shall be used to protect wetland vegetation. The Permittee shall contain and manage soil excavated from the wetlands and riparian areas in accordance with all applicable wetland permits. The Permittee shall access wetlands and riparian areas using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts.

The Permittee shall restore wetland and water resource areas disturbed by construction activities to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. The Permittee shall meet the USACE, DNR, Minnesota Board of Water and Soil Resources, and local government wetland and water resource requirements.

#### **4.3.14 Native Prairie**

The Permittee shall not place the solar energy generating system or associated facilities in native prairie, as defined in Minn. Stat. § 84.02, subd. 5, unless addressed in a prairie protection and management plan and not located in areas enrolled in the Native Prairie Bank Program. The Permittee shall not impact native prairie during construction activities, as defined in Minn. Stat. § 216E.01, unless addressed in a prairie protection and management plan.

The Permittee shall prepare a prairie protection and management plan in consultation with the DNR if native prairie, as defined in Minn. Stat. § 84.02, subd. 5, is identified within the Project Boundary. The Permittee shall file the prairie protection and management plan with the Commission at least 30 days prior to submitting the Site Plan required by Section 8.3 of this site permit. The prairie protection and management plan shall address steps that will be taken to avoid impacts to native prairie and mitigation to unavoidable impacts to native prairie by restoration or management of other native prairie areas that are in degraded condition, by conveyance of conservation easements, or by other means agreed to by the Permittee, the DNR, and the Commission.

#### **4.3.15 Vegetation Removal**

The Permittee shall disturb or clear vegetation within the Designated Site only to the extent necessary to assure the safe construction, operation, and maintenance of the Project. The Permittee shall minimize the number of trees removed within the Designated Site specifically preserving to the maximum extent practicable windbreaks, shelterbelts, and living snow fences.

#### **4.3.16 Beneficial Habitat**

The Permittee shall implement site restoration and management practices that provide for native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators; and that enhances soil water retention and reduces storm water runoff and erosion. To ensure continued management and recognition of beneficial habitat, the Permittee is encouraged to meet the standards for Minnesota's Habitat Friendly Solar Program by submitting project plans, seed mixes, a completed project planning assessment form, and any other applicable documentation used to meet the standard to the Board of Water and Soil Resources (BWSR). If the Permittee chooses to participate in Minnesota's Habitat-Friendly Solar Program, it shall file documents required to be filed with BWSR for meeting and maintaining Habitat Friendly Solar Certification with the Commission.

#### **4.3.17 Vegetation Management Plan**

The Permittee shall develop a vegetation management plan (VMP), in coordination with the Department of Commerce, and the Vegetation Management Working Group (VMWG), using best management practices established by the DNR and BWSR. The Permittee shall file the VMP and documentation of the coordination efforts between the Permittee and the coordinating agencies with the Commission at least 14 days prior to the pre-construction meeting.

Landowner-specific vegetation requests resulting from individual consultation between the Company and a landowner need not be included in the VMP. The Permittee shall provide all landowners within the Designated Site copies of the VMP. The Permittee shall file with the Commission an affidavit of its distribution of the VMP to landowners at least 14 days prior to the pre-construction meeting.

The VMP must include the following:

- (a) management objectives addressing short term (year 0-5, seeding and establishment) and long term (year 5 through the life of the Project) goals;
- (b) a description of planned restoration and vegetation management activities, including how the site will be prepared, timing of activities, how seeding will occur (*e.g.*, broadcast, drilling, etc.), and the types of seed mixes to be used;



- (c) a description of how the site will be monitored and evaluated to meet management goals;
- (d) a description of the management tools used to maintain vegetation (*e.g.*, mowing, spot spraying, hand removal, fire, grazing, etc.), including the timing and frequency of maintenance activities;
- (e) identification of the third-party (*e.g.*, consultant, contractor, site manager, etc.) contracted for restoration, monitoring, and long-term vegetation management of the site;
- (f) identification of on-site noxious weeds and invasive species (native and non-native) and the monitoring and management practices to be utilized; and
- (g) a marked-up copy of the Site Plan showing how the site will be revegetated and that identifies the corresponding seed mixes.

Best management practices should be followed concerning seed mixes, seeding rates, and cover crops.

#### **4.3.18 Agricultural Impact Mitigation Plan**

The Permittee shall develop an agricultural impact mitigation plan (AIMP) in coordination with the Minnesota Department of Agriculture (MDA). The Permittee shall provide landowners within the Designated Site a copy of the AIMP. The Permittee shall file with the Commission the AIMP and an affidavit of the AIMP distribution to landowners at least 14 days prior to the pre-construction meeting.

#### **4.3.19 Application of Pesticides**

The Permittee shall restrict pesticide use to those pesticides and methods of application approved by the MDA, DNR, and the U.S. Environmental Protection Agency (EPA). Selective foliage or basal application shall be used when practicable. All pesticides shall be applied in a safe and cautious manner so as not to damage adjacent properties including crops, orchards, tree farms, apiaries, or gardens. The Permittee shall contact the landowner at least 14 days prior to pesticide application on their property. The Permittee may not apply any pesticide if the landowner requests that there be no application of pesticides within the landowner's property. The Permittee shall provide notice of pesticide application to landowners and beekeepers operating known apiaries within three miles of the pesticide application area at least 14 days prior to such application. The Permittee shall keep pesticide communication and application records and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.20 Invasive Species**



The Permittee shall employ best management practices to avoid the potential introduction and spread of invasive species on lands disturbed by Project construction activities. The Permittee shall develop an Invasive Species Prevention Plan and file it with the Commission at least 14 days prior to the pre-construction meeting. The Permittee shall comply with the most recently filed Invasive Species Prevention Plan.

#### **4.3.21 Noxious Weeds**

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil the Permittee shall select site appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.22 Roads**

The Permittee shall advise the appropriate governing bodies having jurisdiction over all state, county, city, or township roads that will be used during the construction phase of the Project. Where practical, existing roadways shall be used for all activities associated with construction of the Project. Oversize or overweight loads associated with the Project shall not be hauled across public roads without required permits and approvals.

The Permittee shall locate all perimeter fencing and vegetative screening in a manner that does not interfere with routine road maintenance activities and allows for continued safe travel on public roads.

The Permittee shall construct the fewest number of site access roads required. Access roads shall not be constructed across streams and drainage ways without the required permits and approvals. Access roads shall be constructed in accordance with all necessary township, county or state road requirements and permits.

The Permittee shall promptly repair private roads or lanes damaged when moving equipment or when accessing construction workspace, unless otherwise negotiated with the affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.23 Archaeological and Historic Resources**

The Permittee shall make every effort to avoid impacts to archaeological and historic resources when constructing the Project. In the event that a resource is encountered, the Permittee shall

consult with the State Historic Preservation Office (SHPO) and the State Archaeologist. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize Project impacts on the resource consistent with SHPO and State Archaeologist requirements.

Prior to construction, the Permittee shall train workers about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If human remains are encountered during construction, the Permittee shall immediately halt construction and promptly notify local law enforcement and the State Archaeologist. The Permittee shall not resume construction at such location until authorized by local law enforcement or the State Archaeologist. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.24 Interference**

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the Project, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the Project. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.25 Drainage Tiles**

The Permittee shall avoid, promptly repair, or replace all drainage tiles broken or damaged during all phases of the Project's life unless otherwise negotiated with the affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.26 Restoration**

The Permittee shall restore the areas affected by construction of the Project to the condition that existed immediately before construction began to the greatest extent possible. The time period to complete restoration may be no longer than 12 months after the completion of construction, unless otherwise negotiated with the affected landowner. Restoration shall be compatible with the safe operation, maintenance, and inspection of the Project. Within 60 days after completion of all restoration activities, the Permittee shall file with the Commission a Notice of Restoration Completion.

#### **4.3.27 Cleanup**

The Permittee shall remove and properly dispose of all construction waste and scrap from the right-of-way and all premises on which construction activities were conducted upon completion of each task. The Permittee shall remove and properly dispose of all personal litter, including bottles, cans, and paper from construction activities daily.

#### **4.3.28 Pollution and Hazardous Wastes**

The Permittee shall take all appropriate precautions to protect against pollution of the environment. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all waste generated during construction and restoration of the Project.

#### **4.3.29 Damages**

The Permittee shall fairly restore or compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damage sustained during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **4.3.30 Public Safety**

The Permittee shall provide educational materials to landowners within and adjacent to the Designated Site and, upon request, to interested persons about the Project and any restrictions or dangers associated with the Project. The Permittee shall also implement any necessary safety measures such as placing warning signs and gates for traffic control or restricting public access. The Permittee shall file with the Commission an affidavit of its public safety notifications at least 14 days before the pre-construction meeting.

The Permittee shall submit the location of all underground facilities, as defined in Minn. Stat. § 216D.01, subd. 11, to Gopher State One Call following the completion of the construction of the Project.

#### **4.3.31 Site Identification**

The Permittee shall mark the solar energy generating system with a clearly visible identification number and or street address.

#### **4.3.32 Security Fencing**

The Permittee shall design the security fence surrounding the solar energy generating system to minimize the visual impact of the Project while maintaining compliance with the National Electric Safety Code. The Permittee shall develop a final fence plan for the specific site in coordination with the Department of Commerce and the DNR. The final fence plan shall be submitted to the Commission as part of the Site Plan pursuant to Section 8.3.

#### **4.4 Feeder Lines**

The Permittee may use overhead or underground feeder lines to carry power from an internal Project interconnection point to the Project substation or interconnection point on the electrical grid. The Permittee shall place overhead and underground feeder lines that parallel public roads within the public right-of-way or on private land immediately adjacent to the road. The Permittee shall obtain approval from the landowner or government unit responsible for the affected right-of-way.

The Permittee shall locate feeder lines in such a manner as to minimize interference with agricultural operations including but not limited to existing drainage patterns, drain tile, future tiling plans, and ditches. The Permittee shall place safety shields on all guy wires associated with overhead feeder lines. The Permittee shall submit the engineering drawings of all collector and feeder lines with the Site Plan pursuant to Section 8.3.

#### **4.5 Other Requirements**

##### **4.5.1 Safety Codes and Design Requirements**

The Permittee shall design the solar energy generating system and associated facilities to meet or exceed all relevant local and state codes, the National Electric Safety Code, and North American Electric Reliability Corporation requirements. This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements. The Permittee shall keep records of compliance with these standards and provide them upon the request of Department of Commerce staff or Commission staff.

##### **4.5.2 Other Permits and Regulations**

The Permittee shall comply with all applicable state statutes and rules. The Permittee shall obtain all required permits for the Project and comply with the conditions of those permits unless those permits conflict with or are preempted by federal or state permits and regulations.

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission an Other Permits and Regulations Submittal that contains a detailed status of all

permits, authorizations, and approvals that have been applied for specific to the Project. The Other Permits and Regulations Submittal shall also include the permitting agency name; the name of the permit, authorization, or approval being sought; contact person and contact information for the permitting agency or authority; brief description of why the permit, authorization, or approval is needed; application submittal date; and the date the permit, authorization, or approval was issued or is anticipated to be issued.

The Permittee shall demonstrate that it has obtained all necessary permits, authorizations, and approvals by filing an affidavit stating as such and an updated Other Permits and Regulations Submittal prior to commencing Project construction. The Permittee shall provide a copy of any such permits, authorizations, and approvals at the request of Department of Commerce staff or Commission staff.

## **5 SPECIAL CONDITIONS**

The special conditions shall take precedence over other conditions of this permit should there be a conflict.

### **5.1 Visual Screening Plan**

The Permittee shall develop a site-specific Visual Screening Plan. The Visual Screening Plan shall be designed and managed to mitigate visual impacts to adjacent residences. The Visual Screening Plan shall at a minimum include: (a) objectives for screening of nearby residences; and (b) a description of the types of trees and shrub species to be used, the location of plantings, and plans for installation, establishment, and maintenance. The location of trees and shrubs included in the Visual Screening Plan that are located within the Permittee's site control shall be included in the Site Plan filed under Section 8.3. The Permittee is required to maintain and ensure the successful growth, health, and maintenance of the vegetation for 3 years.

At least 14 days prior to the pre-construction meeting, the Permittee shall file:

- (a) the Visual Screening Plan;
- (b) documentation of coordination with landowners within 500 feet of the project site; and
- (c) an affidavit of its distribution of the Visual Screening Plan to landowners within 500 feet of the project site.

### **5.2 Kettle River Wild and Scenic River District**

If temporary workspace is required and permitted within the Kettle River Wild and Scenic River District, then the Permittee must consult with Pine County and complete all work in accordance with the Pine County Kettle River Wild and Scenic River Ordinance. The Permittee shall keep records of compliance with this permit condition and provide them upon the request of Department of Commerce staff or Commission staff.

### **5.3 Snowmobile Trail 187**

The Permittee shall coordinate with the Northern Pine Riders snowmobile club to reroute snowmobile trail 187 and any other snowmobile trails impacted by the project.

### **5.4 Vegetation and Blowing Snow Control**

The Permittee shall coordinate with the Minnesota Department of Transportation (MnDOT) regarding existing vegetation between the project area and Interstate 35. The Permittee shall retain or plant vegetation, as requested by MnDOT, necessary to reduce potential driver distraction, solar glare, and blowing snow.

The Permittee shall coordinate with MnDOT regarding vegetative, structural, and/or other snow fence designs necessary to ensure the safe operation of Interstate 35. The Permittee shall provide documentation of its coordination with MnDOT and illustrate the snow fence design for the project in the Site Plan filed under Section 8.3.

## **6 DELAY IN CONSTRUCTION**

If the Permittee has not commenced construction or improvement of the site within four years after the date of issuance of this site permit the Permittee shall file a Failure to Construct Report and the Commission shall consider suspension of this site permit in accordance with Minn. R. 7850.4700.

## **7 COMPLAINT PROCEDURES**

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission the complaint procedures that will be used to receive and respond to complaints. The complaint procedures shall be in accordance with the requirements of Minn. R. 7829.1500 or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this site permit.

Upon request, the Permittee shall assist Department of Commerce staff or Commission staff with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

## **8 COMPLIANCE REQUIREMENTS**

Failure to timely and properly make compliance filings required by this site permit is a failure to comply with the conditions of this site permit. Compliance filings must be electronically filed with the Commission.

### **8.1 Pre-Construction Meeting**

Prior to the start of construction, the Permittee shall participate in a pre-construction meeting with Department of Commerce staff and Commission staff to review pre-construction filing requirements, scheduling, and to coordinate monitoring of construction and site restoration activities. Within 14 days following the pre-construction meeting, the Permittee shall file with the Commission a summary of the topics reviewed and discussed and a list of attendees. The Permittee shall indicate in the filing the anticipated construction start date.

### **8.2 Pre-Operation Meeting**

At least 14 days prior to commercial operation of the Project, the Permittee shall participate in a pre-operation meeting with Department of Commerce staff and Commission staff to coordinate field monitoring of operation activities for the Project. Within 14 days following the pre-operation meeting, the Permittee shall file a summary of the topics reviewed and discussed and a list of attendees with the Commission.

### **8.3 Site Plan**

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission, and provide the Department of Commerce, and the counties where the Project will be constructed with a Site Plan that includes specifications and drawings for site preparation and grading; specifications and locations of the solar energy generating system and associated facilities; and procedures for cleanup and restoration. The documentation shall include maps depicting the Designated Site, solar energy generating system, and associated facilities layout in relation to that approved by this site permit.

The Permittee may not commence construction until the earlier of (i) 30 days after the pre-construction meeting or (ii) or until the Commission staff has notified the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this site permit.

If the Commission notifies the Permittee in writing within 30 days after the pre-construction meeting that it has completed its review of the documents and planned construction, and finds that the planned construction is not consistent with this site permit, the Permittee may submit additional and/or revised documentation and may not commence construction until the

Commission has notified the Permittee in writing that it has determined that the planned construction is consistent with this site permit.

If the Permittee intends to make any significant changes in its Site Plan or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission, the Department of Commerce, and county staff at least five days before implementing the changes. No changes shall be made that would be in violation of any of the terms of this site permit.

#### **8.4 Status Reports**

The Permittee shall file with the Commission monthly Construction Status Reports beginning with the pre-construction meeting and until completion of restoration. Construction Status Reports shall describe construction activities and progress, activities undertaken in compliance with this site permit, and shall include text and photographs.

If the Permittee does not commence construction of the Project within six months of this site permit issuance, the Permittee shall file with the Commission Pre-Construction Status Reports on the anticipated timing of construction every six months beginning with the issuance of this site permit until the pre-construction meeting. The status updates shall include information on the Project's Midcontinent Independent System Operator (MISO) interconnection process, if applicable.

#### **8.5 Labor Statistic Reporting**

The Permittee shall file quarterly Labor Statistic Reports with the Commission within 45 days of the end of the quarter regarding construction workers that participated in the construction of the Project. The Labor Statistic Reports shall:

- (a) detail the Permittee's efforts and the site contractor's efforts to hire Minnesota workers; and
- (b) provide an account of:
  - i. the gross number of hours worked by or full-time equivalent workers who are Minnesota residents, as defined in Minn. Stat. § 290.01, subd. 7;
  - ii. the gross number of hours worked by or full-time equivalent workers who are residents of other states, but maintain a permanent residence within 150 miles of the Project; and
  - iii. the total gross hours worked or total full-time equivalent workers.

Permittee shall work with its contractor to determine the suitable reporting metric. The report may not include personally identifiable data.



## **8.6 Prevailing Wage**

The Permittee, its contractors, and subcontractors shall pay no less than the prevailing wage rate as defined in Minn. Stat. § 177.42 and shall be subject to the requirements and enforcement provisions under Minn. Stat. §§ 177.27, 177.30, 177.32, 177.41 to 177.435, and 177.45. The Permittee shall keep records of contractor and subcontractor pay and provide them at the request of Department of Commerce staff or Commission staff.

## **8.7 In-Service Date**

At least three days before the Project is to be placed into service, the Permittee shall notify the Commission of the date on which the Project will be placed into service and the date on which construction was completed.

## **8.8 As-Builts**

Within 90 days after completion of construction, the Permittee shall submit to the Commission copies of all final as-built plans and specifications developed during the Project construction.

## **8.9 GPS Data**

Within 90 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (*e.g.*, ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the Project.

## **8.10 Right of Entry**

The Permittee shall allow Commission designated representatives to perform the following, upon reasonable notice, upon presentation of credentials and at all times in compliance with the Permittee's site safety standards:

- (a) To enter upon the facilities easement of the property for the purpose of obtaining information, examining records, and conducting surveys or investigations.
- (b) To bring such equipment upon the facilities easement of the property as is necessary to conduct such surveys and investigations.
- (c) To sample and monitor upon the facilities easement of the property.  
To examine and copy any documents pertaining to compliance with the conditions of this site permit.

## **8.11 Project Energy Production**

The Permittee shall, by February 1st following each complete or partial year of Project operation, file a report with the Commission on the monthly energy production of the facility including:

- (a) the installed nameplate capacity of the permitted facility;
- (b) the total daily energy generated by the facility in MW hours;
- (c) the total monthly energy generated by the facility in MW hours;
- (d) the monthly capacity factor of the facility;
- (e) yearly energy production and capacity factor for the facility;
- (f) the average monthly and average annual solar strength gradient measured in kWh/m<sup>2</sup>/Day observed at the facility;
- (g) the operational status of the facility and any major outages, major repairs, or performance improvements occurring in the previous year; and
- (h) any other information reasonably requested by the Commission.

The Permittee shall file this information in a format recommended by the Department of Commerce. This information shall be considered public and must be filed electronically.

#### **8.12 Emergency Response**

The Permittee shall prepare an Emergency Response Plan (ERP) in consultation with the emergency responders having jurisdiction over the Project prior to construction. The Permittee shall file the ERP, along with any comments from emergency responders to the Commission at least 14 days prior to the pre-construction meeting and a revised ERP, if any, at least 14 days prior to the pre-operation meeting. At least 14 days prior to the pre-operation meeting the Permittee shall file with the Commission an affidavit of the distribution of the ERP to emergency responders and Public Safety Answering Points (PSAP) with jurisdiction over the Project. The Permittee shall obtain and register the Project address or other location indicators acceptable to the emergency responders and PSAP having jurisdiction over the Project.

#### **8.13 Extraordinary Events**

Within 24 hours of discovery of an occurrence, the Permittee shall notify the Commission of any extraordinary event. Extraordinary events include but shall not be limited to fires, solar panel collapse, acts of sabotage, collector or feeder line failure, and injured worker or private person. The Permittee shall, within 30 days of the occurrence, file a report with the Commission describing the cause of the occurrence and the steps taken to avoid future occurrences.

#### **8.14 Wildlife Injuries and Fatalities**

The Permittee shall report any wildlife injuries and fatalities to the Commission quarterly.

## **9 DECOMMISSIONING AND RESTORATION**

### **9.1 Decommissioning Plan**

The Permittee shall comply with the provisions of the most recently filed and accepted Decommissioning Plan. The initial version of the Decommissioning Plan was submitted for this Project as ~~Identify Decommissioning Plan, e.g., Appendix XX to the Site Permit Application]~~[Appendix H to the site permit application](#). The Permittee shall file an updated Decommissioning Plan incorporating comments and information from the permit application process and any updates associated with the final construction plans with the Commission at least fourteen 14 days prior to the pre-construction meeting. The Permittee shall update and file the Decommissioning Plan with the Commission every five years following the commercial operation date.

The Decommissioning Plan shall provide information identifying all surety and financial securities established for decommissioning and site restoration. The Decommissioning Plan shall provide an itemized breakdown of costs of decommissioning all Project components, which shall include labor and equipment. The Decommissioning Plan shall identify cost estimates for the removal of solar panels, racks, underground collection cables, access roads, transformers, substations, and other Project components. The Decommissioning Plan may also include anticipated costs for the replacement of panels or repowering the Project by upgrading equipment.

The Permittee shall also submit the Decommissioning Plan to the local unit of government having direct zoning authority over the area in which the Project is located. The Permittee shall ensure that it carries out its obligations to provide for the resources necessary to fulfill its requirements to properly decommission the Project at the appropriate time. The Commission may at any time request the Permittee to file a report with the Commission describing how the Permittee is fulfilling this obligation.

### **9.2 Site Final Restoration**

Upon expiration of this site permit or upon termination of operation of the Project, the Permittee shall have the obligation to dismantle and remove from the site all solar panels, mounting steel posts and beams, inverters, transformers, overhead and underground cables and lines, foundations, buildings, and ancillary equipment in accordance with the most recently filed and accepted decommissioning plan. To the extent feasible, the Permittee shall restore and reclaim the site to pre-project conditions. Landowners may require the site be returned to agricultural production or may retain restored prairie vegetation, or other land uses as agreed

to between the landowner and the Permittee. All access roads shall be removed unless written approval is given by the affected landowner requesting that one or more roads, or portions thereof, be retained. All such agreements between the Permittee and the affected landowner shall be filed with the Commission prior to commencing restoration activities. The Permittee shall restore the site in accordance with the requirements of this condition and file a Notification of Final Restoration Completion to the Commission within 18 months of termination of operation of the Project.

### **9.3 Abandoned Solar Installations**

The Permittee shall notify the Commission of any solar equipment that is abandoned prior to termination of operation of the Project. Equipment shall be considered abandoned after one year without energy production and shall be decommissioned and the land shall be restored pursuant to sections 9.1 and 9.2, unless a plan is submitted to and approved by the Commission outlining the steps and schedule for returning the equipment to service.

## **10 COMMISSION AUTHORITY AFTER SITE PERMIT ISSUANCE**

### **10.1 Final Designated Site Boundaries**

After completion of construction the Commission shall determine the need to adjust the final boundary of the Designated Site required for the Project. This site permit may be modified, after notice and opportunity for hearing, to represent the actual Designated Site required by the Permittee to operate the Project authorized by this site permit.

### **10.2 Expansion of Designated Site Boundaries**

No expansion of the site boundary described in this site permit shall be authorized without the approval of the Commission. The Permittee may submit to the Commission a request for a change in the boundary of the site for the Project. The Commission will respond to the requested change in accordance with applicable statutes and rules.

### **10.3 Periodic Review**

The Commission shall initiate a review of this site permit and the applicable conditions at least once every five years. The purpose of the periodic review is to allow the Commission, the Permittee, and other interested persons an opportunity to consider modifications in the conditions of this site permit. No modification may be made except in accordance with applicable statutes and rules.

### **10.4 Modification of Conditions**

After notice and opportunity for hearing this site permit may be modified or amended for cause, including but not limited to the following:

- (a) violation of any condition in this permit;
- (b) endangerment of human health or the environment by operation of the Project; or
- (c) existence of other grounds established by rule.

#### **10.5 More Stringent Rules**

The issuance of this site permit does not prevent the future adoption by the Commission of rules or orders more stringent than those now in existence and does not prevent the enforcement of these more stringent rules and orders against the Permittee.

### **11 SITE PERMIT AMENDMENT**

This site permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this site permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required under Minn. R. 7850.4900.

### **12 TRANSFER OF SITE PERMIT**

The Permittee may request at any time that the Commission transfer this site permit to another person or entity (transferee). In its request, the Permittee must provide the Commission with:

- (a) the name and description of the transferee;
- (b) the reasons for the transfer;
- (c) a description of the facilities affected; and
- (d) the proposed effective date of the transfer.

The transferee must provide the Commission with a certification that it has read, understands and is able to comply with the plans and procedures filed for the Project and all conditions of this site permit.

The transferee must provide the Commission with the name and contact information for the site manager, as described in Section 4.3.2, and either a current version with eDocket reference, or a revised version of the following:

- (a) VMP as described in Section 4.3.17;
- (b) complaint procedures, as described in Section 7 and Attachment 1;
- (c) ERP, as described in Section 8.12; and
- (d) Decommissioning Plan, as described in Section 9.1.

The Commission may authorize transfer of the site permit after affording the Permittee, the transferee, and interested persons such process as is required under Minn. R. 7850.5000.

### **13 REVOCATION OR SUSPENSION OF SITE PERMIT**

The Commission may initiate action to revoke or suspend this site permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend this site permit.

### **14 EXPIRATION DATE**

This site permit shall expire ~~10~~30 years after the date this site permit was approved and adopted.

## **Appendix C**

### **Agricultural Impact Mitigation Plan**





# AGRICULTURAL IMPACT MITIGATION PLAN



## **Agricultural Impact Mitigation Plan**

Iron Pine Solar Project

Pine County, Minnesota

Stantec Project #:193708962

February 27, 2023

Prepared for:

Iron Pine Solar Power, LLC  
470 Atlantic Avenue, Suite 601  
Boston, MA 02210

Prepared by:

Stantec Consulting Services Inc.  
3303 Fiechtner Dr  
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## AGRICULTURAL IMPACT MITIGATION PLAN

### Abbreviations

AC	Alternating current
AIMP	Agricultural Impact Mitigation Plan
BMP	best management practices
DC	direct current
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Risk Map
EPC	engineering, procurement, and construction contractor
GIS	Geographic Information System
LCC	Land Capability Class
MPCA	Minnesota Pollution Control Agency
MNBWSR	Minnesota Board of Soil and Water Resources
MNDPH	Minnesota Department of Public Health
MNDNR	Minnesota Department of Natural Resources
MV	medium voltage
Mw	Megawatt
NEC	National Electric Code
NESC	National Electric Safety Code
NRCS	Natural Resources Conservation Service
POI	point of interconnection
Project	Iron Pine Solar Project
PV	photovoltaic
Stantec	Stantec Consulting Services Inc.

## AGRICULTURAL IMPACT MITIGATION PLAN

Stormwater General Permit	General Permit to Discharge under a National Pollutant Discharge Elimination System (NPDES) Permit
SSURGO	Soil Survey Geographic Database
Iron Pine Solar	Iron Pine Solar Energy
UDO	Unified Development Ordinance
VMP	Vegetation Management Plan

## **AGRICULTURAL IMPACT MITIGATION PLAN**

### **Purpose and Applicability of Plan**

## **1.0 PURPOSE AND APPLICABILITY OF PLAN**

The objective of this Agricultural Impact Mitigation Plan (AIMP) is to identify measures that Iron Pine Solar Power, LLC (Iron Pine Solar) and its contractors will take to avoid, mitigate, repair, and/or compensate for potential agricultural impacts that may result from the construction, operation, and eventual decommissioning of the Iron Pine Solar (Project). A 2,296-acre Project Area was analyzed for this AIMP as shown on Figure 1, Site Location Map (Appendix A). Although agricultural operations would temporarily cease on most of the land on which the Project is constructed during the life of the Project, this Plan outlines measures to ensure the land may be returned to future agricultural use following decommissioning of the Project. This AIMP describes the Best Management Practices (BMPs) that will be used during construction, operation, and decommissioning to minimize long-term impacts to soil.

Iron Pine Solar will obtain authorization under the Minnesota Pollution Control Agency (MPCA) Construction Stormwater General Permit under a National Pollutant Discharge Elimination System (NPDES) Permit (MNR100001) prior to the commencement of construction. The NPDES permit will be provided to Pine County prior to any ground disturbance. Temporary stormwater BMPs will be used during Project construction, and construction will be completed in accordance with the MPCA General Permit and a site-specific Erosion Control and Storm Water Management Plan to be developed for the Project.

The site-specific Vegetation Management Plan (VMP) developed for the Project describes the vegetation management practices, including seed mixtures, planting plans and methodologies, and maintenance practices to be conducted during the construction and operational phases of the Project. Permanent perennial vegetative cover will be established throughout the Project Area to manage erosion and increase stormwater infiltration within the Project Area.

This AIMP is separated into six sections: Section 2 provides an overview of the proposed Project and its components. Section 3 identifies soil limitations and suitability within the Project Area; Section 4 describes the BMPs that will be used during construction and operation of the Project; Section 5 summarizes key components of the Vegetative Management Plan in relation to agricultural impact mitigation; Section 6 describes Project Decommissioning and restoration/reclamation of the site.



## AGRICULTURAL IMPACT MITIGATION PLAN

### Project Overview

## 2.0 PROJECT OVERVIEW

The Iron Pine Solar Project (“the Project”) consists of a 325-megawatt (MW) photovoltaic (PV)) solar power generating facility and a 230 kilovolt (kV) high voltage transmission line (“Gen-Tie Line”. The Gen-Tie Line will connect the Project collector substation to a switchyard located at the point of interconnection (POI) to the Minnesota Power Arrowhead-Bear Creek 230 kV transmission line. The Project is sited on approximately 2,296 acres of primarily agricultural land located approximately 0.5 miles south of the Town of Willow River, Pine County, Minnesota.

Iron Pine Solar selected this site due to land use and availability, capacity at the point of interconnection (“POI”), existing transmission facilities, existing road infrastructure, environmental considerations, and constructability (i.e., restrictions due to slopes, soils, wetlands, and waterways).

Iron Pine Solar is responsible for all land acquisition, lease agreements, and easements required to build the Project facilities within the Project Area.

## 2.1 PROJECT COMPONENTS

Table 1 summarizes the major components’ acreages within the Project Area.

**Table 1. Major Project Components and Associated Acreages**

Component	Acreage
<b>Solar Project</b>	
Solar Arrays (fenced area)	1,526.0
Access Roads	24.0
Buried Electrical Collection Lines	5.6
Inverters	0.3
O&M Facility	0.1
Project Substation	6.4
Laydown Yard	19.6
<b>Developed Solar Area Total<sup>1</sup></b>	<b>1,536.7</b>
<b>Undeveloped Solar Array Area<sup>2</sup></b>	<b>670.1</b>
<b>Solar Area Total</b>	<b>2,206.8</b>
Transmission Line Right-of-Way <sup>3</sup>	19.4
Switch Yard	3.9
Access Road to Switchyard	0.8



## AGRICULTURAL IMPACT MITIGATION PLAN

### Project Overview

<b>Developed Gen-Tie Line Area Total</b>	<b>24.1</b>
<b>Undeveloped Gen-Tie Line Area</b>	<b>64.7</b>
<b>Gen-Tie Line Area Total</b>	<b>88.8</b>
<b>Project Total</b>	<b>2,295.6</b>

<sup>1</sup> The Solar Project Development Area includes the area within the Solar Project that is hosting solar equipment and will be surrounded by a fence. The Development Area includes access roads and buried electrical collection lines (including those extending beyond the Solar Project boundary), inverters, an O&M Facility, Project Substation, and temporary laydown yards for a total of 1,536.7 acres.

<sup>2</sup> The Undeveloped Area includes all areas outside the fenced area but within the Solar Project.

<sup>3</sup> The Gen-Tie Line ROW acreage reflects a 160-foot ROW.

### 2.1.1 Solar Panels, Arrays, and Racking

The PV module selected for the Project will have crystalline modules and will be a plate glass module with an aluminum frame with approximate dimensions of 3.9 feet by 7.5 feet (1.2 meters by 2.3 meters), or thin-film technology (cadmium telluride [CdTe]). A total of approximately 570,622 modules are estimated for the basis of design for this application. This estimated number of modules is approximate and is subject to change based on the final design for construction.

The PV modules will be connected in series for up to 1500V operation and will be mounted on a tracker system in-line and oriented such that the long side of the module is facing adjacent modules on racking which tracks east to west to follow the sun throughout the day. The final selection of the PV module and inverters will be made at a future date based on the available market offering. The Canadian Solar 690W module and the SUNGROW 4400kVA central inverter used as the basis of the preliminary Project design.

The trackers are arranged in circuits and blocks, that are separated by roads or AC collection system corridors. The piles will run north to south along the row of modules that are mounted on rails affixed to torque tubes mounted on the piles and this steel structure will likely include an integrated cable management solution in order to support the insulated copper DC string wire which interconnects each of the PV modules.

The PV modules will be installed using industry standard, best practices. Upon completion of the final site design, pile lengths will be specified to allow the PV module racking system and tracker to be constructed at a minimum height above surrounding grade in order to account for average snow accumulation at the Project area.

Foundations or supports will be installed to an appropriate depth following a field investigation and delineation of soil types to minimize impacts from freezing and thawing conditions. Exact embedment depth for the driven pile on which the solar panels are mounted will be determined with final engineering.





# AGRICULTURAL IMPACT MITIGATION PLAN

## Project Overview

### 2.1.2 Electrical Collection System

The current configuration for the collector system contains a bulk total of approximately thirty-five miles of cables consisting of three single conductor cables running in a bundle (one circuit) or a single cable containing all three conductors.

The collector circuits are planned as an underground system with direct buried cables or cables installed in direct buried ducts. The preliminary design assumes the conductor will be aluminum. The collection system will either be buried at a depth of at least 36 inches to the top of the cables or will be enclosed within a conduit and buried at a depth of at least 24 inches. These depths meet minimum cover requirements as specified in table 300.5 of National Electric Code (NEC) 2017, Chapter 3 “Wiring Methods and Materials.” The trench for a single cable will be eighteen inches wide. Where multiple cables are installed parallel to each other, the cable separation will be up to eight feet apart, therefore the width of the trench will vary depending on the number of circuits within the trench.

Installation of the collection system will be by use of a vibratory plow or trenching method in upland areas. The vibratory plow directly impacts an area approximately 12 inches wide and a trench method impacts an area approximately 18 inches wide. Underground horizontal directional drilling (HDD) will be utilized in environmentally sensitive areas, such as nonfarmed wetlands and natural waterways, to avoid impacts to these resources. Trenching methods will be used for installation of the collection system through farmed wetlands and the agricultural drainage ditches within the Project. There are several underground HDD drilling areas that will be used to cross culverts.

### 2.1.3 Gen-Tie Line

The Applicant proposes the construction of approximate one-mile long single circuit 230 kV (AC) Gen-Tie Line using weathering steel monopoles (poles or structures). The poles will be installed to facilitate the connection between the Project Substation and the to-be-built switchyard to tie-in to the Minnesota Power Arrowhead to Bear Creek 230 kV line.

### 2.1.4 Access Roads

Gravel access roads will connect the facility to existing public roads and provide access to Project equipment during facility operations and maintenance as well as to accommodate emergency access. Permanent internal access roads within the Project Area are expected to be approximately 16.3 miles (86,197 feet) in total length and are approximately 12 feet wide. These roads may temporarily be wider during construction to accommodate construction equipment access where necessary. Aggregate materials will be used to develop the access roads. In these areas, topsoil will be stripped and stored for use during reclamation. Geotextile matting will be installed prior to placement of aggregate to prevent mixing with native subsoil. The aggregate would be maintained for the life of the Project. During decommissioning at the end of the Project's life, these areas may be restored unless the host landowner requests that they remain in place. Restoration activities typically include removing the aggregate, decompacting the soil if required, restoring the topsoil and either seeding to permanent perennial vegetation or returning the area to agricultural production.



## **AGRICULTURAL IMPACT MITIGATION PLAN**

### **Project Overview**

#### **2.1.5 Switchyard, Inverters, Substation**

Approximately 82 inverters will be installed throughout the Project area. The final number of inverters for the Solar Project will depend on the inverter size, inverter and module availability, as well as the final array configuration. The inverters are typically part of a skid assembly with the inverter and the assembly being mounted on a driven pile foundation and associated concrete pads. These concreted pads provide the foundation for the inverter, transformer, and the SCADA system. The concrete pads will be poured onsite or precast and assembled off-site. Each inverter pad includes one transformer to which the inverters will feed electricity.

The Project Substation will be located outside the fenced solar arrays and is estimated to occupy approximately 6.4 acres. In addition, a storm water detention facility approximately 0.78 acre in size will be located adjacent to the Project substation. The Project Substation location will be graded and overlain with crushed rock to minimize vegetation growth in the area and reduce fire risk.

A typical construction sequence for the Project Substation involves, in order: site grading work, below-grade foundation installation, above-grade physical construction of buswork and installation of major electrical equipment, wiring and completion of all terminations, followed by testing, commissioning, and ultimately energization. A site-specific construction specification and schedule will be developed closer to the start of construction. All contractors will be required to follow the Storm Water Pollution Prevention Plan, as well as adhere to any site-specific environmental requirements including erosion and dust control.

The switchyard is currently forested and covers approximately 3.9 acres. The location and footprint of these facilities within the Project Area for the preliminary design is shown in Figure 1.

#### **2.1.6 Security Fencing**

Iron Pine Solar will utilize fencing around the PV solar arrays that is consistent with all applicable codes, including NEC and North American Electric Reliability Council Critical Infrastructure Protection requirements. Fencing is required to safeguard the public health. Array fencing will consist of seven- to eight-foot-high woven-wire exclusion fence with wood fenceposts. The Project Substation will require a seven to eight-foot-high chain link fence, which may include three strands of barb wire at the top. Fenceposts will be driven into the ground. No concrete foundations will be used for the fenceposts.

### **2.2 CONSTRUCTION**

The Project will be designed in conformance with the version of the International Building Code as required by the authority having jurisdiction, state, and local requirements. The Project will select an engineering, procurement, and construction contractor (EPC) to manage engineering, procurement, and construction of the Project; subcontractors will be selected to perform all necessary work to construct the Project. Project construction follows a construction sequence in accordance with a construction plan, which will be developed and finalized prior to the start of construction, in conjunction with the selected contractors. The construction plan will be submitted to Pine County prior to commencement of construction. The following provides a general description of the staging and construction sequence for the Project:



## AGRICULTURAL IMPACT MITIGATION PLAN

### Project Overview

- Tracking pads at construction entry and exit points, and erosion control and stormwater best management practices (BMPs) will be installed as outlined in the SWPPP prepared for the Project.
- Vegetation removal (crop removal) will start in areas where initial staging and lay-down areas will be located. Vegetation removal will continue across the site, sequenced to proceed in an organized and cost-efficient manner. Limited brush clearing will commence in a similar fashion. Bare ground will be re-seeded, if necessary, in accordance with the VMP and SWPPP prepared for the Project and MPCA requirements.
- Staging and lay-down areas will be developed to receive and store construction materials and equipment. The lay-down areas will also house trailers and parking for personnel and construction-related vehicles.
- Installation of access roads to facilitate continued clearing operations and construction of the facility (limited grading is anticipated as roads will be constructed at grade when possible).
- Delivery of equipment, including piles, aluminum supports/mounting structures, tracking systems, and inverters. The Project will be constructed in blocks and multiple blocks will be constructed simultaneously over time. Deliveries will continue over time in advance of construction of the blocks.
- Solar block construction in sequence, starting with driving pile foundations, then installing aluminum supports/mounting structures onto the piles.
- Delivery of collection system equipment and installation via trenching and directional drilling.
- Delivery and installation of solar PV modules.
- Stabilization and revegetation of disturbed areas will occur in stages as construction of the solar blocks and collection trenches are completed. Bare ground will be re-seeded, if necessary, in accordance with the SWPPP and MPCA requirements.
- Connect Project Switchgear and Metering and Lone Tree substation and transmission infrastructure.
- Conduct interconnection inspections and testing and Project commissioning.

Site access will be controlled for personnel and vehicles. Permanent security fencing will be installed in advance of or in conjunction with site preparation activities (e.g., grading, mowing, etc.) in advance of large component deliveries. All temporary disturbance areas will be restored in accordance with the Project specific Vegetation Management Plan.

During construction, temporary utilities will serve the construction offices, laydown area, and Project Area. Temporary construction power before the construction of permanent distribution power will either be provided via a local distribution line extended to the Project Area or by temporary diesel generators. Temporary area lighting will be provided and strategically located for safety and security.

The Project on-site workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The construction crews will have approximately 200 to 375 direct workers for the Project. Construction of the Project will



## AGRICULTURAL IMPACT MITIGATION PLAN

### Project Overview

generally occur between 7:00 a.m. and 5:00 p.m., Monday through Friday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities. During the start-up phase of the Project, some activities (such as equipment and system testing) may continue 24 hours per day, 7 days per week. Construction hours will comply with local permit requirements.

Construction of the Project is currently expected to require approximately 14-18 months, which includes mobilization, construction/installation, and commissioning/testing to achieve the targeted commercial operations date of Q1 2027.

The Project will require different equipment types depending on the phase of construction. The first phase consisting of civil work and road building will require dozers, motor graders, and rollers. The pile-driving phase will utilize pile drivers. After pile driving, the installation of racking and panels will be supported mainly by skid steers and telehandlers. Directional drilling equipment, vibratory plows, or trenching equipment for installation of the collection line will be mobilized to the site on low-profile flatbed trailers. For other Project components including the transformers, and inverters; small cranes, bucket trucks, and forklifts will be used to place equipment. Other support equipment such as skid steers, ATVs, and forklifts will also be used.

Delivery trucks will consist of standard, legal load (88,000 pounds or less) over-the-road flatbed and box trucks and will have standard turning radii. Vehicles used inside the arrays will be suitable for the engineered internal access roads and turn-arounds. Equipment typically used in construction and operation of utility scale solar facilities are generally similar in weight or less than equipment typically used in annual agricultural operations. Construction equipment distributes loads widely resulting in similar tire pressure distribution and contact pressures. During construction of a solar facility, the number of vehicle passes in the same wheel tracks is limited, with the exception of vehicles on internal access roads. During construction there will be a concentration of vehicle passes near the site entrances.

### 2.2.1 Site Preparation and Clearing

The Solar Development Area refers to the portion of the Solar Project on which the solar equipment will be located and constitutes a total of 1,537 acres within the proposed fence and access roads and underground cables located outside the fence. The remaining 670 acres will not be developed for the Project and will remain in their current land use of primarily cultivated cropland and woodland. The Solar Development Area include the panels and associated facilities such as inverters, access roads, and underground collector lines. The portion of the Gen-Tie Line extending from the Project Substation that is on the west is of Interstate 35 is included in this area. The portion of the Gen-Tie Line and Switchyard located on the east side of I-35 is not within agricultural land and consists of woodland and wetland and a small amount of developed land

Under existing conditions, the Solar Development Area consists of primarily of active agriculture under row crop production as well as hay/pasture land, woodland and emergent herbaceous wetlands. Prior to the commencement of construction, site vegetation will be evaluated to determine which areas will be mowed, left undisturbed or will require pre-seeding. Areas with limited vegetation due to past farming operations or disruption of vegetation due to civil construction activities will be seeded and stabilized in a timely manner. Portions of the site not



## AGRICULTURAL IMPACT MITIGATION PLAN

### Project Overview

utilized for the Project facilities or not impacted during construction will remain vegetated however may be overseeded to promote additional vegetation as described in the VMP.

Anti-tracking pads will be installed at the construction exits. Temporary perimeter sediment controls and diversions will be installed concurrent with the progress of land clearing and grubbing activities. Prior to any clearing, the limit of disturbance will be surveyed and marked in the field. This limit constitutes the limit of soil disturbance. Work will not be conducted within the stream corridor, the wetland, or their buffers unless authorized by Pine County and by permit from the MN Department of Natural Resources (MNDNR), Minnesota Wetland Conservation Act (WCA) Local Government Unit (LGU), which for this Project is Pine County, and U.S. Army Corps of Engineers, as applicable. Based on the preliminary design, the wetland and the stream corridor within the Project Area have been avoided and no impacts to wetlands or waterways or their buffers are proposed or authorized.

A land surveyor will obtain or calculate Project benchmark, grades, elevations and alignment data from final design plans and detail drawings which inform control staking to establish the Project alignments in advance of construction commencement. During construction, these alignment control points will be reestablished as needed.

### 2.2.2 Grading

Site grading activities will only occur in select areas where elevations need to be modified to accommodate tracker/racking system slope tolerances, site drainage, access roads, laydown areas; and foundations for the inverters, Project Substation, and Switchyard. This approach to grading minimizes impacts and/or preserves existing soil and root structures, topsoil nutrients, seed base, and pre-construction site hydrology.

Grading consists of excavation and soil stabilization of earth as required to meet solar array design load requirements. Grading within the solar array area will match existing grades as closely as possible, however some existing contours may require smoothing for access purposes. To the extent practical, grading of an area will take place shortly before trenching and then again post installation of Project components to minimize the area of open, uncovered ground present at all times during construction. The portions of the Project Area that need to be graded are expected to result in a balanced cut-and-fill quantity of grading to maintain the existing conditions to the extent practical for the protection of the equipment and facilities. Where grading occurs on site, topsoil will be salvaged in areas where cut will be greater than the topsoil depths and those areas where subsoil fill will be placed. Once all cut/fill is completed the topsoil will be replaced.

Materials suitable for soil stabilization and backfill will be stockpiled at designated locations using appropriate segregation and erosion control methods. Materials unsuitable for compaction, such as debris and large rocks, will be stockpiled at designated locations for disposal at an acceptable off-site location. Contaminated materials are not anticipated, but if any are encountered during excavation, they will be disposed of in accordance with applicable laws, ordinances, regulations, and standards.



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#### **2.2.3 Access Road Construction**

Permanent access roads will consist of an improved aggregate base. Roads will be constructed as close to existing grade as possible so that existing sheet flow and drainage patterns are maintained. Erosion control devices will be maintained throughout grading and stabilization according to the SWPPP. Permanent access roads will be maintained for the life of the Project.

Permanent aggregate base access roads will be constructed by first removing the topsoil and organic material, compacting the subgrade, and constructing the road according to civil design requirements. Topsoil will be windrowed to the edges of the road area and distributed along the roadway edge after fill and aggregate installation. Geotextile matting will be installed prior to placement of aggregate to prevent mixing with native subsoil. A layer of road base will then be added and compacted. Road aggregate or fill will be a local pit run aggregate material. Upon completion of detailed engineering, the aggregate specifications will be available for construction quality assurance.

#### **2.2.4 Solar Array Construction**

Once grading activities are complete, the racking system supports will be constructed using steel piles driven into the ground. Driven steel pile foundations are typically used where high load bearing capacities are required. The pile is driven using a pile driver (hydraulic ram), which requires two workers. Soil disturbance would be restricted to the hydraulic ram machinery, about the size of a small tractor, temporarily disturbing soil at each pile insertion location.

Tracker mounting assemblies may be assembled at the Project laydown yard and transported to the array blocks prepared for installation; they can also be assembled at the point of installation. Tracker mounts are then fixed to prepared support foundations using forklifts and tractors. During array and racking assembly, multiple crews and various types of vehicles will be working within the Project Area.

These vehicles include flatbed trucks for transporting array components, small all-terrain vehicles, and pick-up trucks used to transport equipment and workers throughout the Project Area. Modules will be staged in advance throughout the Project Area and be brought to specific work areas for installation by wagon-type trailers pulled by skid steers. The Solar modules will be installed by multiple crews using hand tools.

#### **2.2.5 Electrical Collection System**

Collection system cabling will be installed in upland areas using one of three methods as needed: a chain-driven trenching machine, excavator, cable laying plow, MV cable trailer, or plow equipment pulled by a bulldozer. The trencher will cut an exposed trench approximately 1 foot wide by 3 to 4 feet deep depending on the type of cable installation. Soil disturbance from the trenching machines would be restricted to the trenching machine tracks. Once cables are installed, the trenches would be backfilled using a grader or small bulldozer and a compaction machine. See Section 4.6 for further description of BMP measures to be implemented during trenching activities.



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The horizontal directional drill method will be used to install collection system and will not cross any public roads, as described in Section 4.7.

#### **2.2.6 Inverter, Switchyard, Substation**

The inverters, Switchyard, Project Substation, will be placed on footers with gravel pad foundations that will be designed to specifications necessary to meet the local geotechnical conditions. Each component will sit on top of a slab foundation with rebar on center in each direction. A pull box for cable penetrations will be located directly under the inverter to facilitate through-floor cable connections. After the collection system is installed and foundations are poured, the inverters will be installed into position and will be lifted by crane and set directly onto the pre-poured foundation.

The Contractor will use an appropriately sized rough-terrain crane to lift and set each unit. After the unit is properly set and anchored, the Contractor will feed the collection cabling previously installed in the adjacent trenches to the unit.

#### **2.2.7 Project Security Fencing**

Array fencing will consist of seven- to eight-foot-high woven-wire exclusion fence with wood fenceposts. The Project Substation will require a seven to eight-foot-high chain link fence, which may include three strands of barb wire at the top. Fenceposts will be driven into the ground. No concrete foundations will be used for the fenceposts. Final fence and post specifications will be determined by the EPC.



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## **3.0 SOIL LIMITATIONS AND SUITABILITY WITHIN THE SITE**

Soil varies considerably in its physical and chemical characteristics that strongly influence the suitability and limitations that soil has for construction, reclamation, and restoration. Major soil properties include:

- soil texture;
- soil slope;
- drainage and wetness;
- fertility and topsoil characteristics; and
- presence of stones, rocks, and shallow bedrock.

Interpretative limitations and hazards for construction and reclamation are based to a large degree on the dominant soil properties, and include:

- prime farmland status;
- hydric soil status;
- compaction and rutting potential;
- susceptibility to wind and water erosion;
- susceptibility to compaction;
- fertility and plant nutrition; and
- drought susceptibility and revegetation potential.

## **3.1 IMPORTANT SOIL CHARACTERISTICS**

The Soil Survey Geographic Database (SSURGO) is the digitized county soil survey and provides a Geographic Information System (GIS) relating soil map unit polygons to component soil characteristics and interpretations. Generally, soil map unit polygons in the SSURGO database are clipped to the Project Area and major Project components including:

- Solar Array Area
- Electrical Collection Line
- Generator Tie Line
- Access Roads
- Switchyard and Metering
- Inverters, Switchyard, and Substation

Modern SSURGO datasets for the Project Area are not publicly available because of denied access from the landowner of the proposed Iron Pine Solar facility. One 1935 Pine County soil map is available and included in Appendix A, but was not used in quantifying soil impacts or limitations as there has been numerous soil survey recorrelations over the past 89 years that has resulted in non-existent soil series, soil series that still exist but are no longer found in or around the Project Area, and improved organic soil classification methods. Because of obsolete historic data, and unavailable modern soil spatial data, the acreage of major Project components could not be determined by spatial query of SSURGO to make soil property interpretations important for construction, use, revegetation, and reclamation. Instead, soil types





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mapped in the proximity of and adjacent to the Project Area were analyzed and assumed to be present in the Project Area for the purpose of this report. Notes from the 1935 County Soil Survey were included for discussion where suitable.

This report utilized abutting and adjacent soil map units due to expected similar characteristics of the soils within and outside of the Project Area. Soil genesis theories generally suggest soils that formed on similar landscape positions and climates with similar vegetation and parent material will often have similar characteristics (i.e. be the same). On-site investigations noted landscape positions, vegetation, hydrologic regimes, and parent material within the Project Area that extended beyond the proposed Project boundaries. Soil borings conducted during the field wetland delineations showed similar soil types were consistent to NRCS soil mapping of the surrounding landscape. Limitations of the soils anticipated in the Project Area are explored in the following sections since specific NRCS map unit limitations and acreages couldn't be quantified. A Custom Soil Resource Report for the Project Area which includes a SSURGO Map and descriptions of each map unit is provided Appendix A. Future soil investigations are planned to better classify the soil to provide geotechnical information for site design and construction methods.

#### 3.1.1 Physical Characteristics

Selected physical characteristics of adjacent soils that are anticipated to be within the Project Area are shown in Table 1.

Soil texture affects water infiltration and percolation, drought tolerance, compaction, rutting, and revegetation among other things. Soil texture is described by the soil textural family which indicates the range of soil particle sizes averaged for the whole soil. According to the 1935 soil survey, 1,141.8 acres of the Project Area were classified as Peat and indicate soils dominated by organic material rather than mineral particles. The NRCS soil survey and on-site soil borings also suggest most of the soils anticipated within the Project Area are classified as muck or peat (organic soils). These soils likely reside on the central flat, open, poorly drained extents of the Project Area. Soils are expected to transition to sand and loamy sands as elevation increases on the eastern and western portions of the Project Area near the Kettle River.

Slope affects constructability, water erosion, revegetation, compaction and rutting, among other properties. Soils within the majority of the solar array footprint are anticipated to be within the 0 to 5 percent slope range, based off the surrounding soils on similar landforms. However, steeper slopes are anticipated to occur on the southwest and southeastern portions of the Project Area due to elevation increases and surrounding map units that contain greater slope ranges.

Soil drainage indicates the wetness in the soil profile along with the speed at which internal water moves. Soil Drainage affects constructability, erosion by wind and water, and revegetation success. A majority of the soils observed during on-site soil borings noted organic soils which develop in very poorly drained areas with hydric moisture regimes. The poorly drained designation reflects the flat topography on the site that inhibits water drainage either laterally or vertically. A minor extent of the Project Area is anticipated to be well to excessively well drained and is likely to be in sand-dominated soils such as the Mahtomedi and Grayling sands. Field



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### Soil Limitations and Suitability Within the Site

investigations revealed extensive constructed surface drains throughout the Project Area that has likely altered natural soil drainage properties to support conventional crop production.

Topsoil depth affects soil plant nutrition and surface soil structure. To maintain soil productivity, soils with thick topsoil will require larger areas for storage of larger volume of topsoil stripped from permanent infrastructure footprints such as permanent access roads, inverters and the Project Substation. According to SSURGO mapping, approximately eight soil map units occurring adjacent to the Project Area contains topsoil 0 to 6 inches deep and include the Mahtomedi and Grayling soils. The Greenwood map unit is anticipated to have topsoil ranging from 6 to 12 inches. Lastly, the organic Bowstring, Lougee, and Rifle soils are designated as contain deep O and A horizons that extend beyond the 12 to 18 inches range. Topsoil depth is also correlated to soil order. The most abundant soil order within the Project Area are Histosols and are organic soil that lack mineral soil particles and is consistent with the 1935 Pine County soil survey map. Histosols are typically deep, dark, and contain hydric conditions in undisturbed conditions.

The presence of bedrock near the soil surface and rocks and stones in the soil profile affects constructability and revegetation. No soils in the Project Area are anticipated to be shallow to bedrock but gravel and/or rocks may be common in the profile.



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**Table 2. Soil Physical Characteristics by Adjacent Soil Map Units**

Soil Map Unit	Textural Class <sup>1</sup>	Slope Range (%) <sup>2</sup>	Drainage Class <sup>3</sup>							Topsoil Thickness <sup>4</sup>
			E	SE	W	MW	SP	P	VP	
Bowstring and Fluvaquents, 0 to 2 percent slopes	Mucky	0 – 2							X	>12 – 18
Grayling sand	Muck over Sand	0 – 3 0 – 7 2 – 17 17 – 35	X							0 – 6
Greenwood peat, 0 to 1 percent slopes	Mucky peat	0 - 1							X	6 – 12
Lougee peat, 0 to 1 percent slopes	Sandy or Sandy-Skeletal	0 – 1							X	>12 – 18
Mahtomedi sand	Sandy	0 – 2 0 – 7 2 – 17 17 – 35	X							0 – 6
Rifle mucky peat, 0 to 1 percent slopes, occasionally ponded	Mucky peat	0 - 1							X	>12 - 18
Udfluvents, loamy, 0 to 2 percent slopes, occasionally flooded	undesigned	0 – 2								0 – 6



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- <sup>1</sup> Total acres of Project features that are anticipated to be disturbed by supporting construction equipment traffic, excavation, and grading. Data obtained by merging project facility polygons with the SSURGO spatial data in ArcGIS.
- <sup>2</sup> Data available directly from the Natural Resources Conservation Service SSURGO2 spatial or attribute database via geospatial query of the spatial or attribute data.
- <sup>3</sup> Representative slope values are taken directly from the SSURGO database. The SSURGO2 database provides representative slope values for all component soil series. Slope classes represent the slope class grouping in percent that contains the representative slope value for a major component soil series. For example, a soil mapped in the 2-6% slope class has an average slope of 4%, which is within the 0-5% slope range.
- <sup>4</sup> Drainage class as taken directly from the SSURGO database: "E" Excessively drained; "SE" Somewhat excessively drained; "W" Well drained, "MW" Moderately well drained; "VP" Very poorly drained; "P" Poorly drained; "SP" Somewhat poorly drained.
- <sup>5</sup> Topsoil thickness is the aggregate thickness of the A horizons (in inches) described in the SSURGO database.



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#### 3.1.2 Selected Soil Classification

Selected classification information for soils with the vicinity of the Project Area is presented in Table 2. Natural Resources Conservation Service (NRCS)-designated prime farmland soils have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. No soil within or adjacent to the Project Area is designated as Prime farmland.

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies. One adjacent soil map unit was designated as Farmland of Statewide Importance, but the soil resides on the floodplains of a stream and is not anticipated within the Project Area.

Land Capability Class (LCC) is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have slight limitations that restrict their use.
- Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.
- Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
- Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.



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- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are designated by adding a letter, e, w, s, or c, to the class numeral. The letter e shows the risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation; s shows limitation due to shallow, droughty, or stony soil; and c, shows limitation due to climate that is very cold or very dry. In class 1 there are no subclasses because the soils of this class have few limitations.

Soils surrounding and adjacent to the Project Area are in LCC 2w, 4s, 7s, and 7w. The soil type anticipated to be predominant in the Project Area are Histosols and they contain the greatest limitations with LCC values of 7w and 8w. These limited soils include the Bowstring, Greenweed, Lougee, and Rifle series and they are anticipated to occur on the flatter areas of the Project Area. The Mahtomedi and Grayling soil series contain LCC ratings of 4s but LCC values increase to 7s in the steeper sloped map units and likely occur in the western and eastern portions of the Project Area.

Soil map units are rated based on the proportion that meets the criteria for a hydric soil and the ratings include hydric, predominantly hydric, partially hydric, predominantly non-hydric, and non-hydric. Hydric soils also generally correspond to soil map units with in poorly drained to very poorly drained drainage classes. Hydric soils are a component of regulated wetlands and can be used to indicate areas with potential jurisdictional wetlands. There is a high concentration of hydric soils along the south and north Project Area extents and suggest a high potential of hydric soil within the Project Area. Field investigations that examined hydric soils as part of a wetland delineation revealed there is at least 290 acres of functioning hydric soil present. However, the presence of constructed field drains throughout the site suggests natural hydrological regimes have been altered resulting in soils that should be rated as hydric no longer functioning as such.



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**Table 3. Selected Soil Classifications**

Soil Map Unit	Prime Farmland <sup>1</sup>	Farmland of Statewide Importance	Land Capability Class <sup>3</sup>					Hydric Soil <sup>4</sup>
			2w	4s	7s	7w	8w	
Bowstring and Fluvaquents, 0 to 2 percent slopes	Not Prime Farmland	Not Farmland of Statewide Importance					X	Yes
Grayling sand	Not Prime Farmland	Not Farmland of Statewide Importance		X	X			No
Greenwood peat, 0 to 1 percent slopes	Not Prime Farmland	Not Farmland of Statewide Importance				X		Yes
Lougee peat, 0 to 1 percent slopes	Not Prime Farmland	Not Farmland of Statewide Importance				X		Yes
Mahtomedi sand	Not Prime Farmland	Not Farmland of Statewide Importance		X	X			No
Rifle mucky peat, 0 to 1 percent slopes, occasionally ponded	Not Prime Farmland	Not Farmland of Statewide Importance					X	Yes
Udifluvents, loamy, 0 to 2 percent slopes, occasionally flooded	Not Prime Farmland	Farmland of Statewide Importance	X					No
<sup>1</sup> Data available directly from the NRCS SSURGO2 spatial or attribute database via geospatial query of the spatial or attribute data. Includes all areas Prime Farmland and Prime farmland if drained or irrigated. <sup>2</sup> Capability subclasses are designated by adding a letter, e, w, s, or c, to the class numeral. The letter e shows the risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation; s shows limitation due to shallow, droughty, or stony soil; and c, shows limitation due to climate that is very cold or very dry. <sup>3</sup> Data available directly from the NRCS SSURGO2 spatial or attribute database via geospatial query of the spatial or attribute data. Includes Hydric, Predominantly hydric, and Partially hydric soil.								

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#### 3.1.3 Construction-Related Interpretations

Selected construction-related interpretative data for site soils are broken down by acreage within the Project Area in Table 3.

For the purposes of this report, a highly erodible rating consists of soils with an NRCS Soil Erodibility Factor (Kw) rating of 0.4 to 0.69. Soil Erodibility Factor (Kw) describes the susceptibility of soil detachment by water runoff or raindrop impact and predicts long-term average soil loss from sheet and rill erosion. The Kw is affected by soil texture, organic matter content, size and stability of soil aggregates, permeability, and depth to a restrictive layer. Soil erosion potential is also influenced by slope and exposure to erosion mechanisms. Soil erosion increases in inverse proportion to the effectiveness of vegetation cover (i.e., soils with denser vegetation cover are less susceptible to erosion). Removal of vegetation associated with construction activities, whether by direct stripping or by other mechanical means, greatly increases erosion potential. The soil types existing around and likely throughout the Project Area are not anticipated to be severely susceptible to water erosion.

Wind erosion was evaluated using the wind erodibility group. Highly wind erodible soils are medium textured, relatively well drained soils with poor soil aggregation, resulting in soils with soil surfaces dominated by particles that can be dislodged and carried by the wind. Three soil types identified as adjacent to the Project Area are designated as highly wind erodible and are the Mahtomedi sands, Grayling sands, and Bowstring and Fluvaquents soils.

Soils prone to compaction and rutting are subject to adverse changes in soil porosity and structure as a result of mechanical deformation caused by loading by equipment during construction. Factors considered are soil texture, soil organic matter content, soil structure, rock fragment content, and the existing bulk density. Each of these factors contributes to the soil's ability to resist compaction and rutting. Only the Udifluent soils (if present) are anticipated to be susceptible to compaction. Organic soils that are likely extensive are not as compressible as a typical mineral soil. Despite low compaction risks, all of the soil anticipated to be within the Project Area is severely susceptible to rutting.

Two basic methods for installing ground-based solar array systems are installation via pilings or anchoring via precast footing or ballasted trays. The penetrating method includes driven piles, screw augers, or concrete piers to provide a stable foundation. The ease of installation and general site suitability of soil-penetrating anchoring systems depends on soil characteristics such as rock fragment content, soil depth, soil strength, soil corrosivity, shrink-swell tendencies, and drainage. The anchoring system utilizes precast ballasted footings or ballasted trays on the soil surface to make the arrays too heavy to move. The site considerations that impact both basic systems are slope, slope aspect, wind speed, land surface shape, flooding, and ponding. Project Area site conditions and cost dictate which method is employed. Installation of these systems requires some power equipment for hauling components and either driving piles, turning helices, or boring holes to install the anchoring apparatus. As described in Section 2.1.1 and Section 2.2.4, driven steel piles are planned to be used for installation of the racking system for the Project.

SSURGO provides interpretive rating classes for soil suitability ratings for "Ground-based Solar Panel Arrays." SSURGO soil suitability ratings for both Ground-based Solar Panel Arrays





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include “Not Limited”, “Somewhat Limited”, or “Very Limited”, depending on the type of solar array construction methods. Overall, all adjacent soil map units are rated as “Very Limited” and suggest the anticipated solar panel array suitability in the Project Area will be “Very Limited”. The limitations are due low soil strength, a shallow depth to a saturated zone, frost action, and ponding. A geotechnical or high-intensity soil survey conducted by a qualified firm can determine the most suitable installation method.

The final analyzed soil limitation is drought susceptibility. Even under relatively normal precipitation, some soils are prone to having drought stress occur in the plants growing on them. Soil may have an inherently low ability to store water which is typical of sandy or shallow soils or soils having a high content of rock fragments. Drought ratings include severely drought vulnerable, drought vulnerable, moderately drought vulnerable, somewhat drought vulnerable, and slightly drought vulnerable.

In the severely drought vulnerable rating, the soil and site properties are such that the plants growing on the soil must be very drought tolerant even in years with normal amounts of rainfall. The soil may have very low water storage capacity. In the drought vulnerable rating, drought conditions generally occur every year and the soil may have low water storage capacity. Under moderately drought vulnerable soils, annual precipitation is generally adequate for plant growth. In dry years some water stress may occur. Slightly drought vulnerable soils are either in low-lying parts of the landscape where plant roots may exploit near-surface ground water or are in areas where precipitation is much higher than potential evapotranspiration. In an extremely dry year plants may be water stressed on these soils.

Soils susceptible to drought include coarse textured soils in moderately well to excessive drainage classes. Revegetation during seed germination and early seedling growth is severely compromised during dry periods on droughty soils. Most of the surrounding soils were slightly drought vulnerable, with only the sand-dominated Mahtomedi and Grayling soils being rated as drought vulnerable.



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**Table 4. Soils in Selected Construction-related Interpretations**

Project Facility	Kw <sup>1</sup>	Wind Erodibility <sup>2</sup>	Compaction Prone <sup>3</sup>	Rutting Hazard <sup>4</sup>		Solar Array <sup>5</sup>	Drought Vulnerable <sup>6</sup>		
	Moderate	High		Moderate	Severe	Very Limited	Slightly Vulnerable	Moderately Vulnerable	Drought Vulnerable
Bowstring and Fluvaquents, 0 to 2 percent slopes		X			X	X	X		
Grayling sand		X		X		X			X
Greenwood peat, 0 to 1 percent slopes					X	X	X		
Lougee peat, 0 to 1 percent slopes					X	X	X		
Mahtomedi sand		X		X		X			X
Rifle mucky peat, 0 to 1 percent slopes, occasionally ponded					X	X	X		
Udifluvents, loamy, 0 to 2 percent slopes, occasionally flooded	X		X		X	X		X	

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- 1 Erosion Factor Kw indicates the susceptibility of a whole soil to sheet and rill erosion by water, and is a function of percent silt, sand, organic matter, soil structure, and hydraulic conductivity (Ksat). For the purposes of this report, values range from 0.02 and 0.69. A rating of 0.0-0.24 is Low, a rating of 0.25-0.40 is Moderate, and a rating of 0.40-0.69 is High.
- 2 Highly Erodible Wind Includes soils in wind erodibility groups 1 and 2.
- 3 Soils are rated Low, Medium, or High based on their susceptibility to compaction from the operation of ground-based equipment for planting, harvesting, and site preparation activities when soils are moist. For soils with a Low rating, the potential for compaction is insignificant. For soil with a Medium rating, the potential for compaction is significant and the growth rate of seedlings may be reduced following compaction. For soil with a High rating, the potential for compaction is significant and the growth rate of seedlings will be reduced following compaction. Soils with a Medium or High rating are represented in this table.
- 4 Rutting potential hazard based on the soil strength as indicated by engineering texture classification, drainage class, and slope. In general, soils on low slopes in wetter drainage classes, and comprised of sediments with low strength will have potential rutting hazards.
- 5 Soils are placed into interpretive rating classes of Not limited, Somewhat limited, or Very limited.
- 6 Soils are rated Slightly vulnerable, Somewhat drought vulnerable, Moderately drought vulnerable, Drought vulnerable, and Severely drought vulnerable. Soils rated as Somewhat drought vulnerable and Moderately drought vulnerable are represented in this table. No soils within the Project Area are rated as Drought vulnerable, and Severely drought vulnerable.



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### **Soil Limitations and Suitability Within the Site**

#### **3.1.4 Summary of Major Soil Limitations**

##### **3.1.4.1 Wind Erodibility**

The predominant rating for soil susceptibility to wind erosion was severe and is a result of organic soils and fine sand textured soils. These soils may have low vegetative cover, an expansive area, or lower particle cohesive forces that detach and erode easily with wind. Exposed topsoil, whether on stockpiles, nearby areas, or slopes, may be lost and transported into waterways or wetlands furthering potential environmental impairment. Therefore, protecting the soil surface via plant residues, perennial plant cover, soil binding agents, or soil wetting must be implemented. Soil erosion and other BMPs that can mitigate impacts to wind (and water) erodible soils are described in Section 4.10 and the Project-specific SWPPP. Initial post-construction revegetation efforts and maintenance of vegetation during operations and maintenance will need to consider selecting appropriate vegetation to grow quickly and include regular inspections of erosion controls after precipitation events as described in the VMP.

##### **3.1.4.2 Land Capability Classification**

The predominant LCC surrounding the Project Area is 7w-8w, suggesting potentially severe limitations to land use and conservation practices and an added susceptibility to excess water below and above the ground, agreeing with Section 3.1.4.3. These soil interpretations underline the importance of utilizing suitable revegetation and soil conservation methods as described in the VMP.

##### **3.1.4.3 Solar Arrays**

The predominant anticipated soil texture/type in the Project Area is muck or peat, followed by sands. The primary limitations for these soil types during construction, operations and maintenance, and decommissioning include low soil strength, saturated soil, frost action, and ponding. A geotechnical and soils investigation would identify appropriate methods required for installation of the racking systems and foundations within these soil types. As described in Section 2.1.1, the racking system supports will be determined following an on-site soil survey and will depend on delineated soil types.

##### **3.1.4.4 Compaction & Rutting**

Iron Pine Solar will design construction access and manage construction passes to minimize the number of trips occurring on a given soil and will implement wet weather procedures any time that rutting is observed. Deep compaction is not anticipated to be a significant problem as the number of construction equipment passes over a given area is limited, and construction equipment consists of smaller, low-ground- pressure tracked vehicles. Practices to be implement to decompact soils are described in Section 4.2 and the project specific VMP. Factors to be considered regarding wet weather conditions are described in Section 4.3. Rutting will be avoided by use of temporary construction matting as described in Section 4.9. No rutting will occur within the wetland as impact to the wetland has not been proposed or authorized by



## **AGRICULTURAL IMPACT MITIGATION PLAN**

### **BMPs During Construction and Operation**

the USACE or Pine County. Based on the preliminary design, the wetland and one stream within the Project Area have been avoided and no impacts to wetlands are proposed.

## **4.0 BMPS DURING CONSTRUCTION AND OPERATION**

The Project will be constructed and operated on property leased by Iron Pine Solar. No direct impacts to adjacent land are expected. The Project is located on farmland occupying a flat to gently sloping floodplain/wetland complex on the east side of Kettle River. Most of the farmland has been drained via constructed ditches to support crop production prior to 1985. The farmland is not designated as prime farmland or farmland of statewide importance.

The prevailing topography of the Project Area will not be substantially changed by construction activities, including installation of the foundations for the tracking systems and trenching for the collection system. It is anticipated that panel arrays will be designed and constructed to conform to the existing flat topography to minimize the need for significant grading. However, some localized grading may be necessary to meet racking tolerances and to construct other project facilities such as the transformer, switchgear, MV power station, and metering. Access roads will be constructed as close to existing grade as possible, maintaining preconstruction hydrologic flow patterns. Upon completion of construction activities, the areas temporarily impacted due to construction activities will be returned to their pre-construction topography.

A final grading plan will be submitted to the MPCA as part of the Stormwater Pollution Prevention Plan (SWPPP) submitted for closer to construction, but prior to site disturbance. The final grading plan will show existing and proposed contours for any areas that will require grading. The final grading plan will show the location of perimeter erosion control measures to be used throughout construction, location of stockpiles, location of bore pits, and location and dimensions of road drainage ditches, if proposed.

The sections below describe the best management practices that Iron Pine Solar will implement to maintain soil health, slope stabilization, and infiltration and avoid sedimentation, erosion, spill-related impacts, and encroachment of noxious weeds within the Project Area due to construction and operation of the Project.

### **4.1 ENVIRONMENTAL MONITOR**

Iron Pine Solar will engage a weekly inspection onsite to monitor earthmoving activities during the initial phase of Project construction to ensure appropriate measures are taken to properly segregate and handle the topsoils. The Monitor will have a variety of duties, including but not limited to:

- Perform regular inspections during the major earthmoving phases of Project construction, including trenching, and during activities in the below bullets;
- Observe construction crews and activities to ensure that topsoil is being segregated and managed appropriately;



## AGRICULTURAL IMPACT MITIGATION PLAN

### BMPs During Construction and Operation

- Monitor the site for areas of potential soil compaction (except within access roads) and make specific recommendations for decompaction;
- Make recommendations to Iron Pine Solar's construction manager;
- Assist in determining if weather events have created "wet weather" conditions and provide recommendations to the construction manager on the ability to proceed with construction; and
- Submit reports of Iron Pine Solar's adherence to soil BMPs during the major earthmoving phase of Project construction and upon completion of earthmoving activities to document SWPPP compliance.

Potential issues with BMPs will be reported directly to Iron Pine Solar's construction manager who will use discretion to either correct the activity or stop work.

## 4.2 SOIL SEGREGATION AND DECOMPACTION

During construction, Iron Pine Solar will work to protect and preserve topsoil within the Project Area. Site preparation will include clearing and grubbing, where needed, prior to any topsoil stripping. Topsoil will be separated from subgrade/subsoil materials when earthmoving activities or excavation are conducted during grading, road construction, cable installation, and foundation installation. The depth of the topsoil to be stripped will be a maximum depth of 12 inches or actual depth of topsoil if less than 12 inches or as agreed upon with the landowner.

The stored topsoil and subsoil will have sufficient separation to prevent mixing during the storage period. A thin straw mulch layer or geotextile fabric may be used as a buffer between the subsoil and topsoil to facilitate separation of the subsoil and topsoil during the excavation backfill process. Topsoil will not be used to construct field entrances or drives, will not be stored or stockpiled at locations that will be used as a traveled way by construction, or be removed from the property.

During the activities that require temporary excavations and backfilling (i.e., trenching activities) the subgrade material will be replaced into the excavations first and compacted as necessary, followed by replacement of topsoil to the approximate locations from which it was removed. Topsoil will then be graded to the approximate pre-construction contour. Iron Pine Solar will avoid compaction in other areas where it is not required by the design.

Following grading activities that require segregation of topsoils/subsoils, topsoil materials will be re-spread on top of the backfilled and disturbed areas to maintain the overall integrity and character of the pre-construction farmland. Any excess topsoil material would be re-spread within the Project Area at pre-established locations and not relocated off-site. The location and amount of topsoil will be documented to facilitate re-spreading of topsoil after decommissioning.

Stripped topsoil and subsoil that will be necessary for future reclamation for components such as access road installation and the transformer, switchgear, MV power station, and metering will be removed to suitable locations near the site of removal and spread across existing topsoil for storage.



## AGRICULTURAL IMPACT MITIGATION PLAN

### BMPs During Construction and Operation

#### 4.3 WET WEATHER CONDITIONS

Construction in wet soil conditions will not commence or continue at times when or locations where the passage of heavy construction equipment may cause rutting to the extent that the topsoil and subsoil are mixed, or underground drainage structures may be damaged.

During construction, certain activities may be suspended in wet soil conditions, based on consideration of the following factors:

- extent of surface ponding;
- extent and depth of soil erosion, rutting, compaction, and mixing of soil horizons;
- areal extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area);
- damage to drain tiles if present; and
- type of equipment and nature of the construction operations proposed for that day.

If adverse wet weather construction impacts cannot be minimized to the satisfaction of Iron Pine Solar, the EPC will cease work in the applicable area until Iron Pine Solar determines that site conditions are such that work may continue.

#### 4.4 INITIAL GRADING/ROAD CONSTRUCTION/ARRAY CONSTRUCTION

A final grading plan will be developed closer to construction, but prior to site disturbance. The final grading plan will show existing and proposed contours for any areas that will require grading. The final grading plan will show the location of perimeter erosion control measures to be used throughout construction, location of stockpiles, location of bore pits, and location and dimensions of road drainage ditches, if proposed.

Micro-grading or site leveling will likely be necessary prior to array installation to accommodate slope tolerances allowed for by the solar array design. The appropriate depth of topsoil that should be stripped and segregated from other materials during initial grading activities is described in Section 4.2.

During civil work, topsoil will be removed from the cut/fill areas and stored in designated locations for later use. Once topsoil is removed from the cut/fill areas, the sub-grade materials will be removed as required from higher ground elevations and relocated on-site at lower elevations. Prior to relocating sub-grade materials to the lower elevations, topsoil in the low areas will be stripped and set aside before the fill is added, then respread over the new fill. The stored topsoil will be re-spread over the reconditioned sub-grade areas. Newly spread topsoil will be loosely compacted and/or “tracked” and the erosion and sedimentation prevention BMPs will be implemented as described in Section 4.10 and in accordance with the Project SWPPP.

After the majority of the micro-grading activities have been completed, internal access roads will be constructed. Topsoil will be stripped from the roadbeds to a depth of at least 12 inches and will be windrowed to the edges of the roadbed. Windrowing will consist of pushing materials into rows of spoil piles adjacent to the road which will be loosely compacted and/or “tracked” with



## **AGRICULTURAL IMPACT MITIGATION PLAN**

### **BMPs During Construction and Operation**

stormwater and wind erosion BMPs in place. The sub-grade materials will then be compacted. Roads shall be constructed at grade to allow for existing sheet flow so that existing drainage patterns are maintained. Previously windrowed topsoil material will be respread around the new gravel material along the road shoulders.

Once grading and road construction is complete, the Contractor can begin the installation of foundation piles for the PV array racking system as described in Section 2.1.1 and 2.2.4. This work will consist of directly driving the pile into the soil with pile drivers. These vehicles would operate on the existing surface of the ground and impacts would be limited to what is typical when vehicles drive over the soil surface. Very little soil disturbance is expected from this activity.

Dust abatement measures may include restriction of vehicle speeds, watering of active areas, watering of stockpiles, watering on public roadways, the application of calcium chloride (or other similarly approved product), track-out control at site exits, and other measures.

## **4.5 FOUNDATIONS**

The skids for the inverters will likely be installed on driven pier foundations but could be placed on concrete foundations if required by soil and geotechnical conditions as described in Section 2.1.4. The Contractor will strip topsoil off the area for the foundation, install the pier-type foundations, compact sub-grade materials, re-grade spoils around the foundation area, and then install clean washed rock on the surface. All topsoil stripped from these areas will be pushed outside of the work area and collected into designated spots for later use. These topsoil piles will be windrowed or piled and loosely compacted and/or “tracked” with stormwater and wind erosion BMPs in place. Once construction is advanced, the topsoil piles would be distributed in a thin layer adjacent to the foundation area.

If concrete foundations are used, the foundations will be dug using a rubber-tire backhoe and then rebar and concrete installed and left to cure. After cure and testing of concrete strength is completed, the subgrade spoils will be compacted around the foundations. After the solar equipment is set, the adjacent topsoil will be re-spread around the foundation.

## **4.6 TRENCHING**

Construction of the Project may require trenching for the installation of both DC and AC collection lines. The typical burial depth for collector circuits is 36 inches. The trench for a single cable will be eighteen inches wide. Where multiple cables are installed parallel to each other, the cable separation will be up to eight feet apart, therefore the width of the trench will vary depending on the number of circuits within the trench.

During trenching, topsoil and subgrade materials would be excavated from the trench using typical excavating equipment or backhoes and segregated as described in Section 4.2. The bottom of each trench may be lined with clean fill to surround the cables. Iron Pine Solar anticipates that native subsoil will be rock free, and that no foreign fill will be necessary. After





## AGRICULTURAL IMPACT MITIGATION PLAN

### BMPs During Construction and Operation

cables have been installed on top of bedding materials in the trench, 1 foot of screened, native backfill will be placed on the cables followed by additional 2 feet of unscreened native backfill trench spoil. This material would be compacted as necessary. The last 1 foot of each trench will then be backfilled with topsoil material only to return the surface to its finished grade.

## 4.7 HORIZONTAL DIRECTIONAL DRILL

Underground horizontal directional drilling (HDD) will be utilized in environmentally sensitive areas, such as nonfarmed wetlands and natural waterways, to avoid impacts to these resources. Bore pits will be setback at least 10 feet from stream corridor and wetland buffer boundaries. Based on the preliminary design, the non-farmed wetlands within the Project Area have been avoided and no impacts to wetlands are proposed. One MDNR Public Watercourse, which has been previously altered from its natural course where it crosses through the Development Area will be crossed via collection line cable in two locations based on the current design. These crossings will be conducted via HDD and will not impact the waterway. Proper sediment, erosion control, and invasive species control Best Management Practices (BMPs) will be installed/utilized prior to and during construction activities.

Horizontal directional drill boring equipment will be stored either in the Project laydown yard or near the location of the proposed boring. If the boring cannot be completed in one day, overnight storage of equipment will be in upland agricultural areas within 50 feet of the bore pits. Appropriate BMPs and contaminant management (oil absorbent booms, etc.) materials will be put in place prior to leaving the boring area for the day.

A typical bore pit is approximately 10 feet by 20 feet by 6 feet deep. Approximately 1,200 cubic feet (45 cubic yards) of material may be excavated for each pit. The boring will require two bore pits, one on each side of the road being crossed. All materials removed from bore pits will be stored adjacent to the boring with appropriate BMPs installed. Once the boring is completed, the excavated material will be reused as backfill of the pit. Once a final grade is reached, the area will be seeded with a cover crop and permanent seed mixture with appropriate erosion control devices installed (silt fence, erosion matting, etc.), if necessary.

## 4.8 DEWATERING

Dewatering may be required for excavations such as bore pits. Iron Pine Solar will develop a Dewatering Plan and provide training to personnel directly involved with discharge activities. Iron Pine Solar shall ensure that on-site personnel directly involved with discharge activities have access to the Dewatering Plan at all times while at the discharge location(s). Dewatering will be performed in accordance with applicable appropriation and discharge permits, and at a minimum, will comply with the following procedures:

- Floats will be placed on pump intakes.



## AGRICULTURAL IMPACT MITIGATION PLAN

### BMPs During Construction and Operation

- The excavation will be dewatered into a well-vegetated upland area with an appropriate energy-dissipation device. Whenever possible, the slope at the point of discharge will be away from any streams or wetlands. Soils in the vicinity of the discharge point will be assessed before discharge. Topography between the discharge point and the nearest receiving waters will be evaluated for erosion potential.
- If the flow of a discharge cannot be kept out of streams, wetlands, drainage ditches, etc., the discharge shall be filtered by one of the methods described below. Dewatering discharge will be directed into a sediment filter bag or a straw bale/silt fence dewatering structure which discharges into a vegetated area to prevent heavily silt-laden water from flowing into wetlands and waterbodies.
- Only non-woven fabric filter bags will be used for dewatering.
- Filter bags and dewatering structures must be maintained in a functional condition throughout dewatering activity (e.g., clogged or ripped bags must be replaced) and will be attended at all times during active pumping. Accumulated sediment from the filter bags shall be spread in an approved upland location.
- Iron Pine Solar will comply with applicable permit requirements, including tracking volumes of water pumped, obtaining water samples (if needed) for testing, and taking necessary measures to meet effluent limitations.

## 4.9 TEMPORARY EROSION AND SEDIMENT CONTROL

Iron Pine Solar will prevent excessive soil erosion on lands disturbed by construction by adhering to an SWPPP required under the NPDES permitting requirement that will be administered by the MPCA. Prior to construction, the Project's Engineer of Record will outline the reasonable methods for erosion control and prepare the SWPPP.

These measures would primarily include silt fencing on the downside of all hills and near wetlands and surface drains. This silt fencing would control soil erosion via stormwater. Check dams and straw waddles will also be used to slow water during rain events in areas that have the potential for high volume flow. In addition, the Contractor can use erosion control blankets on any steep slopes, although given the site topography, this BMP will not likely be required. Lastly, as outlined above, topsoil and sub-grade material will be piled and loosely compacted and / or "tracked" while stored. The BMPs employed to mitigate wind and stormwater erosion on these soil stockpiles will include installing silt fence on the downward side of the piles as needed and installation of straw waddles if these spoil piles are located near waterways.

The SWPPP will designate onsite SWPPP inspectors to be employed by the Contractor for routine inspections as well as for inspections after storm events per the plan outlined in the SWPPP. The SWPPP will consider wind erodibility and best practices as such including methods such as wetting exposed soils to minimize dust during construction activity and maintaining good vegetative cover (both cover crops and permanent vegetation).



## AGRICULTURAL IMPACT MITIGATION PLAN

### BMPs During Construction and Operation

The SWPPP will be submitted to the MPCA prior to construction start and designated onsite SWPPP inspectors will be employed by the Contractor for routine inspections as well as for inspections after storm events per the plan outlined in the SWPPP.

#### 4.10 DRAIN TILE IDENTIFICATION, AVOIDANCE AND REPAIR

Iron Pine Solar or its EPC contractor will work to identify any existing non-abandoned drain tile systems within the Project Area and may include the use of local drain tile contractor. Existing non-abandoned tile will be located by analyzing existing documentation, reviewing aerial photography, and interviewing Project participating landowners and adjacent landowners to identify approximate or expected locations of the tile lines. If the location of the existing tile system is not accurately determined, a physical tile location effort may be undertaken. Physical location of tile may be attempted using ground penetrating radar in the areas of suspected tile locations, or GPS-enabled line scope. If visible surface inlets are identified, a tile probe may be used to locate the tile line and determine its direction from the inlet. The tile line will then be mapped with a GPS locator so it can be avoided during construction.

Care will be taken during construction to: a) avoid drain tile locations within the Project Area, b) re-route drain tile away from locations which could be damaged during construction, or c) in the case of fields with pattern tile networks, work with applicable landowners to establish acceptable criteria for rerouting, replacing or abandoning in place drain tile that is within a photovoltaic (PV) array.

If non-abandoned drain tile is damaged, the damaged segment will be repaired in place or, if necessary, relocated as required by the condition and location of the damaged tile. In the event drain tile damage becomes apparent after commercial operation of the Project, the drain tile will be repaired in a manner that restores the operating condition of the tile at the point of repair and will have the capacity, depth, and appropriate slope to ensure the new tile line performs adequately for the line it is replacing. All repair, relocation, or rerouting referenced above will be consistent with these policies: a) materials will be of equal or better quality to those removed or damaged; b) work will be completed as soon as practicable, taking into consideration weather and soil conditions; c) work will be performed in accordance with industry-accepted, modern methods; and d) in the event water is flowing through a tile when damage occurs, temporary repairs will be promptly installed and maintained until such time that permanent repairs can be made. Iron Pine Solar will minimize interruption of any drainage on site or on any neighboring farms that may drain through the property.

Repairs or rerouting will be performed using a small to mid-sized excavator. Laser equipment will be used to ensure proper grading of the tile. In the event a line of significant size and length needs to be rerouted or installed; a commercial drainage plow could be used. The drainage plow typically utilizes GPS-grade control to ensure tile is installed to specified slopes. The following considerations will also apply:

- Tiles will be repaired with materials of the same or better quality as that which was damaged.
- Tiles repairs will be conducted in a manner consistent with industry-accepted methods.



## **AGRICULTURAL IMPACT MITIGATION PLAN**

### **BMPs During Construction and Operation**

- 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 so they operate as well after construction as before construction began.
- Iron Pine Solar will make efforts to complete permanent tile repairs within a reasonable timeframe, considering weather and soil conditions.

### **4.11 CENTER-PIVOT IRRIGATION WELL IDENTIFICATION AND AVOIDANCE**

Where center-pivot irrigation systems are present within the Project Area, the systems and the water/utility lines servicing them within the Project Area will be decommissioned and left in place. If wells are located within the solar array area, they will either be marked with flagging and a five-foot buffer around them will be fenced to protect these structures, or fully decommissioned. If Iron Pine Solar identifies a need for wells during operations, these wells may be uncapped or new wells may be installed. Any new wells will be permitted in accordance with Pine County and/or MN Department of Health standards.



## 5.0 VEGETATIVE MANAGEMENT PLAN

Iron Pine Solar is committed to minimizing impacts to soil within the Project Area so that the site may be returned to active agricultural production upon decommissioning. In accordance with the VMP, Iron Pine Solar will establish a permanent vegetative cover throughout the Project Area including areas beneath and around arrays. This will manage erosion by increasing stormwater infiltration and reducing runoff. Stormwater infiltrates soil at a higher rate on perennially vegetated ground cover than on cultivated cropland. The transition to permanent perennial vegetation will manage additional runoff resulting from the solar modules and access roads. Permanent perennial vegetative cover also provides connectivity to existing adjacent wildlife habitats.



## **6.0 CONTROLLING SPREAD OF UNDESIRABLE SPECIES**

During construction and operation, appropriate BMPs will be used to manage and limit the spread of invasive and noxious weed species. Invasive and noxious weed control practices to be conducted during pre-construction, construction and operation of the project, soil handling, and equipment cleaning are described in the VMP.

Equipment will be cleaned before mobilization to the site to prevent introduction of invasive species from off-site sources. The equipment will be manually cleaned of plant materials between work zones within the Project Site. Project Plan details can be found in the Vegetation Management Plan developed for the Project.



## 7.0 DECOMMISSIONING

The Project will operate for at least 30 years and the useful life of the Project may be 35 or 40 years based on current forecasts for modern equipment. At the end of the useful life of the Project, Iron Pine Solar will be responsible for removing all of the solar arrays and other associated facilities and restoring the site to its prior use. At the end of the anticipated Site Permit, the Applicant reserves the right to extend operations of the Project by applying for an extension of the permit to continue operation. Should the Applicant decide to continue operation, a decision would be made as to whether the Project would continue with the existing equipment or to upgrade the facilities with newer technologies. In general, the majority of decommissioned equipment and materials will be recycled. Materials that cannot be recycled will be disposed of at approved facilities.

At the end of the Project's useful life, the Project would cease operation. At that time, the facilities would be decommissioned and dismantled and the site restored in accordance with the Decommissioning Plan developed for the Project.

### 7.1 RESTORATION/RECLAMATION OF FACILITY SITE

Once the solar facilities are removed, the site would be restored to agricultural use or to another use if the economic conditions and landowner intentions at that time indicate another use is appropriate for the site. Restoration activities will be conducted in accordance with the Decommissioning Plan and VMP.

After steel pier foundations, fence posts, concrete foundations, re-claimed access road corridors and other equipment are removed the site will be returned to original the original topography to the extent practicable and will be restored with either stockpiled soil or by supplemental soil. Soils will be decompacted if necessary. The method of decompaction will depend on how compacted the soil has become. Soils will be de-compacted by using a tractor and disc to a 12-inch depth or a tractor and a deep subsoiler, if necessary. Grading and other soil disturbance activities conducted during decommissioning will be minimized to the extent necessary to effectively decommission the site and to maintain the soil benefits realized during the long-term operation of the Project.



# **APPENDIX A**





## **AGRICULTURAL IMPACT MITIGATION PLAN**

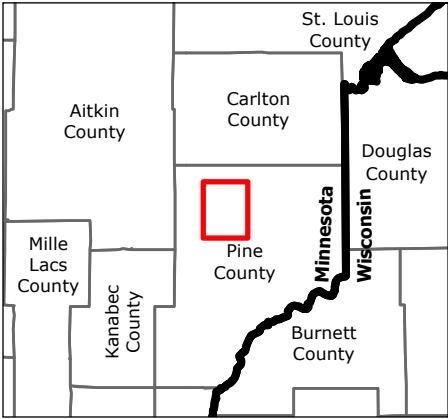
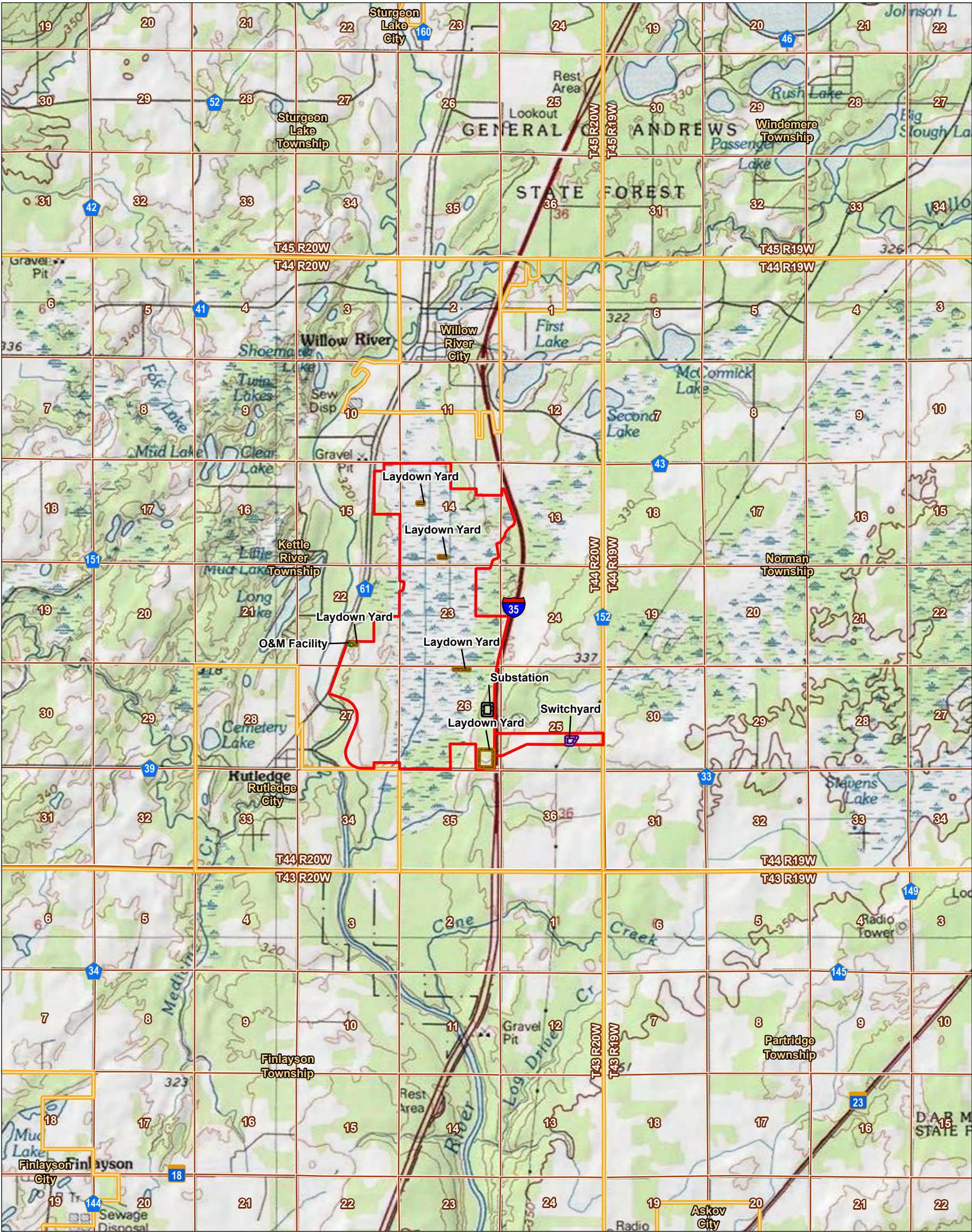
### **Appendix A**

## **Appendix A**

- A.1 SITE LOCATION MAP**
- A.2 USDA NRCS SOIL SURVEY MAP**
- A.3 GRADING PLAN (To be inserted based on final design)**
- A.4 SITE PLAN (To be inserted based on final design)**
- A.5 1935 PINE COUNTY SOIL SURVEY MAP**







- Legend
- Project Area Boundary
  - Proposed Laydown Yard
  - Proposed O&M Facility
  - Proposed Substation
  - Proposed Switchyard
  - County Subdivision
  - Township, Range & Section Boundary

0 0.5 1 Miles  
(At original document size of 11x17)  
1:63,360



Project Location  
Kettle River Township  
Pine County, Minnesota  
Client/Project  
Iron Pine Solar, LLC  
Iron Pine Solar Project  
MnPUC Site Permit Application

Map No.

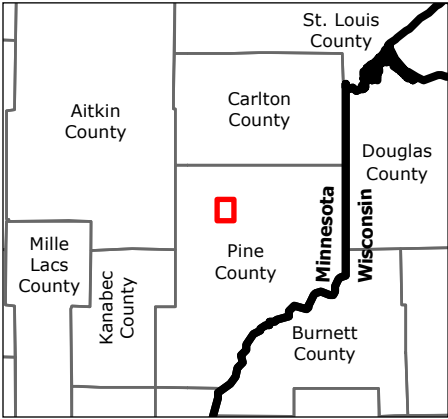
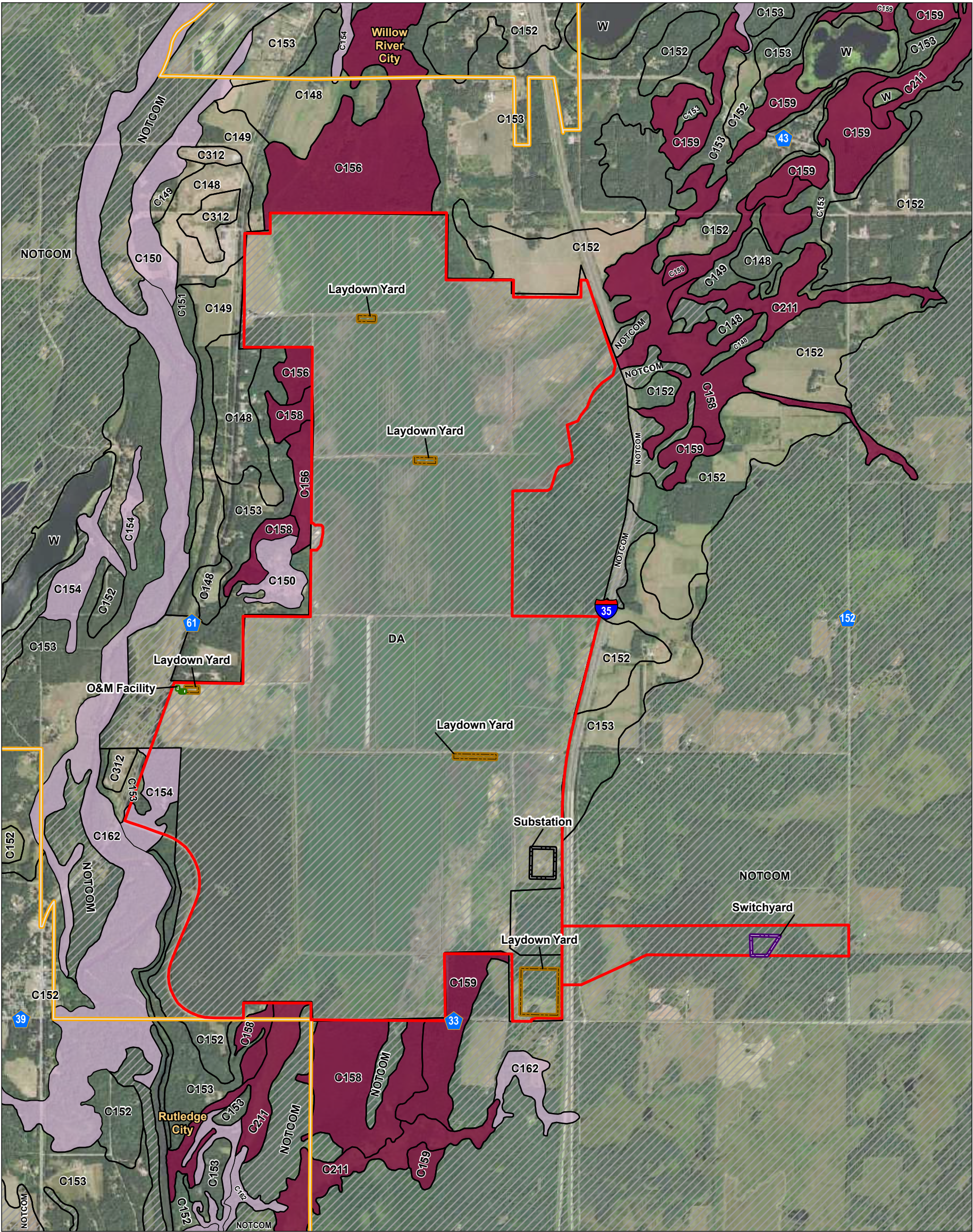
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Title

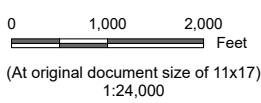
Project Location

Notes  
1. Coordinate System: NAD 1983 UTM Zone 15N  
2. Data Sources: Swift Current Energy, Stantec, MnGeo, MnDOT  
3. Background: USGS Quadrangle





- Legend**
- Project Area Boundary
  - Municipal Boundary
  - NRCS Soil Survey Data\*
  - Hydric Soil Rating
    - Hydric
    - Predominantly Non-Hydric
    - Non-Hydric
    - Denied Access / No Digital Data Available
- \*Available NRCS data incomplete for significant portion of project area.



Project Location Kettle River Township Pine County, Minnesota Prepared by KJM on 2024-01-25

Client/Project Iron Pine Solar, LLC 193708962

Iron Pine Solar Project MnPUC Site Permit Application

Figure No.

A.2

Soil Resources - NRCS

**Notes**  
1. Coordinate System: NAD 1983 UTM Zone 15N  
2. Data Sources: Swift Current Energy, Stantec, ESRI, MnGeo, MnDOT, NRCS  
3. Background: 2021 NAIP







## **Appendix D**

### **Greenhouse Gas Emissions Estimates**



Iron Pine Solar Power, LLC  
Iron Pine Solar Project  
GHG Calculations

Table 1. Summary of Construction GHG Emissions

Emission Source	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e (metric tons)
<b>Direct Sources</b>				
Off Road Mobile Combustion	3,889.01	3.85E-01	3.58E-01	3,994.67
On Road Mobile Combustion	80.39	1.80E-03	1.24E-01	113.26
Temporary Land Use Change	--	--	--	2,856.43
<b>TOTAL - ALL SOURCES</b>	<b>3,969.40</b>	<b>0.39</b>	<b>0.48</b>	<b>6,964.36</b>

Iron Pine Solar Power, LLC  
Iron Pine Solar Project  
GHG Calculations

Table 2. Summary of Operations GHG Emissions

Emission Source	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e (metric tons/year)
<b>Direct Sources</b>				
Mobile Combustion	2.90	2.61E-06	3.96E-07	2.90
Land Use Change	--	--	--	6,237.78
<b>TOTAL - ALL SOURCES</b>	<b>2.90</b>	<b>0.00</b>	<b>3.96E-07</b>	<b>6,240.68</b>



Iron Pine Solar Power, LLC  
Iron Pine Solar Project  
GHG Calculations

Table 3. Summary of Decommissioning GHG Emissions

Emission Source	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e (metric tons/year)
<b>Direct Sources</b>				
Off Road Mobile Combustion	2,222.29	0.22	0.20	2,282.67
On Road Mobile Combustion	45.94	0.00	0.07	64.72
<b>TOTAL - ALL SOURCES</b>	<b>2,268.23</b>	<b>0.22</b>	<b>0.28</b>	<b>2,347.39</b>

**Iron Pine Solar Power, LLC**  
**Iron Pine Solar Project**  
**GHG Calculations**

**Table 4. Conversions**

Unit	Amount	Unit
1 US ton	2000	lbs
1 US ton	0.907185	metric tons
1 US ton	907.185	kg
1 US ton	907185	grams
1 lb	0.453592	kg
1 lb	453.592	grams
1 MWh	1000	kWh
1 hectare	2.47105	acres
1 MJ	0.372506136	hp-h
US gallon (diesel) <sup>[1]</sup>	144.945	MJ
US gallon (diesel)	53.9929019	hp-h
US gallon (gasoline) <sup>[1]</sup>	126.833	MJ
US gallon (gasoline)	47.24606261	hp-h

[1] US Energy Information Administration, 2024.

<https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php>

Table 5. Global Warming Potentials

Greenhouse Gas Name	CAS Number	Chemical Formula	Global Warming Potential (100-yr. )[1]
Carbon dioxide	124-38-9	CO <sub>2</sub>	1
Methane	74-82-8	CH <sub>4</sub>	28
Nitrous oxide	10024-97-2	N <sub>2</sub> O	265

[1] Global Warming Potentials from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024.  
<https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 6. Construction Emissions from Off-Road Fuel Combustion Sources

Equipment Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Number of Units <sup>[1]</sup>	Annual Operating Time per Unit <sup>[2]</sup> (hours)	Estimated Horsepower <sup>[3]</sup>	CO <sub>2</sub> Emission Factor <sup>[4]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[5]</sup> (g/gal)	N <sub>2</sub> O Emission Factor <sup>[5]</sup> (g/gal)	CO <sub>2</sub> Emission Factor <sup>[4]</sup> (lb/hr)	CH <sub>4</sub> Emission Factor <sup>[5]</sup> (lb/hr)	N <sub>2</sub> O Emission Factor <sup>[5]</sup> (lb/hr)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Crane	Diesel	0	2,080	0	10.21	1.01	0.94	0.00	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00	-
Backhoe	Diesel	0	2,080	0	10.21	1.01	0.94	0.00	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00	-
Loaders	Diesel	4	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	550.66	5.45E-02	5.07E-02	565.62
Bulldozer	Diesel	5	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	688.32	6.81E-02	6.34E-02	707.02
Excavators	Diesel	5	2,080	400	10.21	1.01	0.94	166.76	1.65E-02	1.54E-02	786.65	7.78E-02	7.24E-02	808.02
Skid Steer	Diesel	5	2,080	100	10.21	1.01	0.94	41.69	4.12E-03	3.84E-03	196.66	1.95E-02	1.81E-02	202.01
TOTAL	--	--	--	--	--	--	--	--	--	--	3,889.01	0.38	0.36	3,994.67

[1]Based on information in Appendix M of the Joint Permit Application.

[2] Operating hours are estimated based on information from similar projects.

[3] hp units were based on information from the Joint Permit Application.

Equipment Type	Estimated Horsepower
Crane	0
Backhoe	0
Excavators	400
Bulldozer	350
Loaders	350
Skid Steer	100

[4] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for Non-Road Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Fuel Type	CH <sub>4</sub> Emission Factor (g/gal)	N <sub>2</sub> O Emission Factor (g/gal)
Construction/Mining Equipment	Diesel Equipment	1.01	0.94
Construction/Mining Equipment	Gasoline (4 stroke)	2.85	1.47

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Construction Duration:	1.75 years
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Table 7. Construction Emissions from On-Road Fuel Combustion Sources

Vehicle Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Vehicles per Day <sup>[1]</sup>	Miles per Vehicle per Day <sup>[1]</sup>	Number of Days <sup>[1]</sup>	Total Miles Traveled	Fuel Efficiency <sup>[2]</sup> (miles/gal)	Fuel Used (gal)	CO <sub>2</sub> Emission Factor <sup>[3]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	N <sub>2</sub> O Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Light Duty Vehicles - Laborers (commute)	Gas	25	20	260	130,000	24.8	5,232	8.78	0.0079	0.0012	45.94	1.03E-03	7.08E-02	64.72
Light Duty Vehicles - Laborers (commute)	Diesel	25	20	260	130,000	24.8	5,232	10.21	0.0290	0.0214	53.42	3.77E-03	1.26E+00	387.93
Heavy Duty Trucks - Dump Trucks (onsite and offsite)	Diesel	5	20	260	26,000	7.9	3,279	10.21	0.0095	0.0431	33.48	2.47E-04	5.08E-01	168.19
Heavy Duty Trucks - Semis (onsite and offsite)	Diesel	8	20	50	8,000	6.9	1,157	10.21	0.0095	0.0431	11.82	7.60E-05	1.56E-01	53.26
<b>TOTAL</b>	--	--	--	--	--	--	--	--	--	--	<b>80.39</b>	<b>0.00</b>	<b>0.12</b>	<b>113.26</b>

[1] Based on information in Appendix M of the Joint Permit Application.

[2] Fuel efficiency from 2022 values from U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), Table VM-1. <https://www.fhwa.dot.gov/policyinformation/statistics/2022/vm1.cfm>

Vehicle Type	Average Fuel Consumption (miles/gal)
Light Duty Vehicles Short WB 2/	24.85
Single-Unit Trucks	7.93
Combination Trucks	6.91

[3] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Motor Gasoline	8.78
Diesel Fuel	10.21

[4] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles, Table 3: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Gasoline Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Gasoline Light-Duty Trucks	2021	0.0079	0.0012

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road diesel vehicles, Table 4: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Diesel and Alternative Fuel Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Light-Duty Trucks	2007-2021	0.0290	0.0214
Medium- and Heavy-Duty Trucks	2007-2021	0.0095	0.0431

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Construction Duration:	1.75 years
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Table 8. Construction Land Use Change GHG Emissions

Temporary Land Use Change <sup>[1]</sup>	Area of Land Change <sup>[1]</sup> (acres)	2022 Net CO <sub>2</sub> Flux for Converted Land Type <sup>[2],[3]</sup> (M metric tons CO <sub>2</sub> e)	2022 Total US Land Use Change to Settlement <sup>[4]</sup> (thousands of hectares)	CO <sub>2</sub> e Emission Factor (metric tons CO <sub>2</sub> e/acre)	CO <sub>2</sub> e <sup>[5],[6]</sup> (metric tons)
Forest Land to Settlement	280.85	58.6	440	53.90	2,488.26
Cropland to Settlement	1,664.75	2.9	1,228	0.96	261.53
Wetlands to Settlement	191.49	0.1	14	2.89	90.99
Grassland to Settlement	51.68	7.5	1,648	1.84	15.65
Settlement remaining Settlement	15.14	15.4	43,748	0.14	0.35
<b>TOTAL</b>	<b>2,203.91</b>	<b>84.50</b>	<b>47,078.00</b>	<b>59.58</b>	<b>2,856.43</b>

[1] Estimated from development area delineation files and NLCD land cover estimates.

[2] Table 6-136: Net CO<sub>2</sub> Flux from Soil, Dead Organic Matter and Biomass Carbon Stock Changes for Land Converted to Settlements, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[3] Table 6-119: Net CO<sub>2</sub> Flux from Soil C Stock Changes in Settlements Remaining Settlements, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[4] Table 6-5: Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[5] Emissions are calculated for an assumed 60-day duration of temporary disturbance.

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 9. Operations Emissions from Fuel Combustion Sources

Source <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Fuel Consumption <sup>[1]</sup> (gallons/year)	CO <sub>2</sub> Emission Factor <sup>[2]</sup> (kg/gallon)	CH <sub>4</sub> Emission Factor <sup>[3]</sup> (g/gallon)	N <sub>2</sub> O Emission Factor <sup>[3]</sup> (g/gallon)	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e <sup>[4]</sup> (metric tons/year)
Mobile Source Equipment	Gasoline	330	8.78	0.0079	0.0012	2.90	2.61E-06	3.96E-07	2.90
TOTAL	--	--	--	--	--	2.90	2.61E-06	3.96E-07	2.90

[1] Estimated using provided fuel consumption of 1.32 gal/day and 250 operating days/year in Appendix M of the Join Permit Application.

[2] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Motor Gasoline	8.78

[3] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles, Table 3: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Gasoline Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Gasoline Light-Duty Trucks	2021	0.0079	0.0012

[4] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 10. Operations Land Use Change GHG Emissions

Land Use Change <sup>[1]</sup>	Area of Land Change <sup>[1]</sup> (acres)	2022 Net CO <sub>2</sub> Flux for Converted Land Type <sup>[2],[3]</sup> (M metric tons CO <sub>2</sub> e)	2022 Total US Land Use Change to Settlement <sup>[4]</sup> (thousands of hectares)	CO <sub>2</sub> e Emission Factor (metric tons CO <sub>2</sub> e/acre)	CO <sub>2</sub> e <sup>[5]</sup> (metric tons/year)
Forest Land to Settlement	86.85	58.6	440	53.90	4,680.85
Cropland to Settlement	1358.25	2.9	1,228	0.96	1,298.07
Wetlands to Settlement	66.07	0.1	14	2.89	190.99
Grassland to Settlement	36.85	7.5	1,648	1.84	67.87
Settlement remaining Settlement	1.03	15.4	43,748	0.14	0.15
<b>TOTAL</b>	<b>1,549.05</b>	<b>84.50</b>	<b>47,078.00</b>	<b>59.58</b>	<b>6,237.78</b>

[1] Estimated from development area delineation files and NLCD land cover estimates.

[2] Table 6-136: Net CO<sub>2</sub> Flux from Soil, Dead Organic Matter and Biomass Carbon Stock Changes

[3] Table 6-119: Net CO<sub>2</sub> Flux from Soil C Stock Changes in Settlements Remaining Settlements, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[4] Table 6-5: Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[5] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>



Table 11. Decommission Emissions from Off-Road Fuel Combustion Sources

Equipment Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Number of Units <sup>[1]</sup>	Operating Time per Unit <sup>[2]</sup> (hours)	Estimated Horsepower <sup>[3]</sup>	CO <sub>2</sub> Emission Factor <sup>[4]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[5]</sup> (g/gal)	N <sub>2</sub> O Emission Factor <sup>[5]</sup> (g/gal)	CO <sub>2</sub> Emission Factor <sup>[4]</sup> (lb/hr)	CH <sub>4</sub> Emission Factor <sup>[5]</sup> (lb/hr)	N <sub>2</sub> O Emission Factor <sup>[5]</sup> (lb/hr)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Crane	Diesel	0	2,080	250	10.21	1.01	0.94	104.22	1.03E-02	9.60E-03	-	-	-	-
Backhoe	Diesel	0	2,080	0	10.21	1.01	0.94	-	-	-	-	-	-	-
Loaders	Diesel	4	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	550.66	5.45E-02	5.07E-02	565.62
Bulldozer	Diesel	5	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	688.32	6.81E-02	6.34E-02	707.02
Excavators	Diesel	5	2,080	400	10.21	1.01	0.94	166.76	1.65E-02	1.54E-02	786.65	7.78E-02	7.24E-02	808.02
Skid Steer	Diesel	5	2,080	100	10.21	1.01	0.94	41.69	4.12E-03	3.84E-03	196.66	1.95E-02	1.81E-02	202.01
TOTAL	--	--	--	--	--	--	--	--	--	--	2,222.29	0.22	0.20	2,282.67

[1] Based on information in Appendix M of the Joint Permit Application.

[2] Operating hours are estimated based on information from similar projects.

[3] hp units were based on information from the Joint Permit Application.

Equipment Type	Estimated Horsepower
Crane	250
Backhoe	0
Excavators	400
Bulldozer	350
Loaders	350
Skid Steer	100

[4] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for Non-Road Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Fuel Type	CH <sub>4</sub> Emission Factor (g/gal)	N <sub>2</sub> O Emission Factor (g/gal)
Construction/Mining Equipment	Diesel Equipment	1.01	0.94
Construction/Mining Equipment	Gasoline (4 stroke)	2.85	1.47

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 12. Decommission Emissions from On-Road Fuel Combustion Sources

Vehicle Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Vehicles per Day <sup>[1]</sup>	Miles per Vehicle per Day <sup>[1]</sup>	Number of Days <sup>[1]</sup>	Total Miles Traveled	Fuel Efficiency <sup>[2]</sup> (miles/gal)	Fuel Used (gal)	CO <sub>2</sub> Emission Factor <sup>[3]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	N <sub>2</sub> O Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Light Duty Vehicles - Laborers (commute)	Gas	25	20	260	130,000	24.8	5,232	8.78	0.0079	0.0012	45.94	1.03E-03	7.08E-02	64.72
Light Duty Vehicles - Laborers (commute)	Diesel	25	20	260	130,000	24.8	5,232	10.21	0.0290	0.0214	53.42	3.77E-03	1.26E+00	387.93
Heavy Duty Trucks - Dump Trucks (onsite and offsite)	Diesel	5	20	200	20,000	7.9	2,522	10.21	0.0095	0.0431	25.75	1.90E-04	3.91E-01	129.37
Heavy Duty Trucks - Semis (onsite and offsite)	Diesel	8	20	50	8,000	6.9	1,157	10.21	0.0095	0.0431	11.82	7.60E-05	1.56E-01	53.26
<b>TOTAL</b>	--	--	--	--	--	--	--	--	--	--	<b>45.94</b>	<b>1.03E-03</b>	<b>0.07</b>	<b>64.72</b>

[1] Based on information from Appendix M of the Joint Permit Application.

[2] Fuel efficiency from 2022 values from U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), Table VM-1. <https://www.fhwa.dot.gov/policyinformation/statistics/2022/vm1.cfm>

Vehicle Type	Average Fuel Consumption (miles/gal)
Light Duty Vehicles Short WB 2/	24.85
Single-Unit Trucks	7.93
Combination Trucks	6.91

[3] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Motor Gasoline	8.78
Diesel Fuel	10.21

[4] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles, Table 3: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Gasoline Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Gasoline Light-Duty Trucks	2021	0.0079	0.0012

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road diesel vehicles, Table 4: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Diesel and Alternative Fuel Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Light-Duty Trucks	2007-2021	0.0290	0.0214
Medium- and Heavy-Duty Trucks	2007-2021	0.0095	0.0431

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 13. Avoided GHG Emissions

Fuel	Energy Production <sup>[1]</sup> (MWh/year)	eGRID State	CO <sub>2</sub> Emission Factor <sup>[2]</sup> (lb/MWh)	CH <sub>4</sub> Emission Factor <sup>[2]</sup> (lb/MWh)	N <sub>2</sub> O Emission Factor <sup>[2]</sup> (lb/MWh)	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e <sup>[3][4]</sup> (metric tons/year)
State Average Emission Rate	647,000	Minnesota	768.241	0.082	0.012	225,459.03	24.06	3.52	227,066.09
Coal	647,000	Minnesota	2210.327	0.2402	0.0349	648,674.27	70.49	10.24	653,362.26

[1] Energy production value based on data provided by Iron Pine Solar, LLC.  
[2] U.S. eGrid Factors 2022 data, Total Output Emissions Rates for Minnesota, lb/MWh; <https://www.epa.gov/egrid/download-data>  
[3] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Iron Pine Solar Power, LLC  
Iron Pine Gen Tie Line Project  
GHG Calculations

Table 1. Summary of Construction GHG Emissions

Emission Source	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e (metric tons)
<b>Direct Sources</b>				
Off Road Mobile Combustion	1,183.91	1.17E-01	1.09E-01	1,216.08
On Road Mobile Combustion	37.74	2.76E-04	5.68E-01	188.25
Temporary Land Use Change	--	--	--	427.73
<b>TOTAL - ALL SOURCES</b>	<b>1,221.65</b>	<b>0.12</b>	<b>0.68</b>	<b>1,832.05</b>

Iron Pine Solar Power, LLC  
Iron Pine Gen Tie Line Project  
GHG Calculations

Table 2. Summary of Operations GHG Emissions

Emission Source	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e (metric tons/year)
<b>Direct Sources</b>				
Mobile Combustion	2.90	2.61E-06	3.96E-07	2.90
Land Use Change	--	--	--	572.93
<b>TOTAL - ALL SOURCES</b>	<b>2.90</b>	<b>2.61E-06</b>	<b>3.96E-07</b>	<b>575.83</b>

**Iron Pine Solar Power, LLC**  
**Iron Pine Gen Tie Line Project**  
**GHG Calculations**

**Table 3. Conversions**

Unit	Amount	Unit
1 US ton	2000	lbs
1 US ton	0.907185	metric tons
1 US ton	907.185	kg
1 US ton	907185	grams
1 lb	0.453592	kg
1 lb	453.592	grams
1 MWh	1000	kWh
1 hectare	2.47105	acres
1 MJ	0.372506136	hp-h
US gallon (diesel) <sup>[1]</sup>	144.945	MJ
US gallon (diesel)	53.9929019	hp-h
US gallon (gasoline) <sup>[1]</sup>	126.833	MJ
US gallon (gasoline)	47.24606261	hp-h

[1] US Energy Information Administration, 2024.

<https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php>

Table 4. Global Warming Potentials

Greenhouse Gas Name	CAS Number	Chemical Formula	Global Warming Potential (100-yr. )[1]
Carbon dioxide	124-38-9	CO <sub>2</sub>	1
Methane	74-82-8	CH <sub>4</sub>	28
Nitrous oxide	10024-97-2	N <sub>2</sub> O	265

[1] Global Warming Potentials from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024.  
<https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 5. Construction Emissions from Off-Road Fuel Combustion Sources

Equipment Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Number of Units <sup>[1]</sup>	Operating Time <sup>[2]</sup> (hours)	Estimated Horsepower <sup>[3]</sup>	CO <sub>2</sub> Emission Factor <sup>[3]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[4]</sup> (g/gal)	N <sub>2</sub> O Emission Factor <sup>[4]</sup> (g/gal)	CO <sub>2</sub> Emission Factor <sup>[5]</sup> (lb/hr)	CH <sub>4</sub> Emission Factor <sup>[5]</sup> (lb/hr)	N <sub>2</sub> O Emission Factor <sup>[5]</sup> (lb/hr)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Crane	Diesel	1	2,080	320	10.21	1.01	0.94	133.41	1.32E-02	1.23E-02	125.86	1.25E-02	1.16E-02	129.28
Backhoe	Diesel	1	2,080	100	10.21	1.01	0.94	41.69	4.12E-03	3.84E-03	39.33	3.89E-03	3.62E-03	40.40
Loaders	Diesel	1	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	137.66	1.36E-02	1.27E-02	141.40
Bulldozer	Diesel	1	2,080	350	10.21	1.01	0.94	145.91	1.44E-02	1.34E-02	137.66	1.36E-02	1.27E-02	141.40
Excavator	Diesel	1	2,080	400	10.21	1.01	0.94	166.76	1.65E-02	1.54E-02	157.33	1.56E-02	1.45E-02	161.60
Skid Steer	Diesel	2	2,080	100	10.21	1.01	0.94	41.69	4.12E-03	3.84E-03	78.67	7.78E-03	7.24E-03	80.80
TOTAL	--	--	--	--	--	--	--	--	--	--	1,183.91	1.17E-01	1.09E-01	1,216.08

[1]Based on information in Appendix M of the Joint Permit Application.

[2] Operating hours are estimated based on information from similar projects.

[3] hp units were based on information from the Joint Permit Application.

Equipment Type	Estimated Horsepower
Crane	320
Backhoe	100
Excavator	400
Bulldozer	350
Loaders	350
Skid Steer	100

[4] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Diesel Fuel	10.21
Motor Gasoline	8.78

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for construction/mining equipment, Table 5: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for Non-Road Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Fuel Type	CH <sub>4</sub> Emission Factor (g/gal)	N <sub>2</sub> O Emission Factor (g/gal)
Construction/Mining Equipment	Diesel Equipment	1.01	0.94
Construction/Mining Equipment	Gasoline (4 stroke)	2.85	1.47

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Construction Duration:	1.75 years
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Table 6. Construction Emissions from On-Road Fuel Combustion Sources

Vehicle Type <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Vehicles per Day <sup>[1]</sup>	Miles per Vehicle per Day <sup>[1]</sup>	Number of Days <sup>[1]</sup>	Total Miles Traveled	Fuel Efficiency <sup>[2]</sup> (miles/gal)	Fuel Used (gal)	CO <sub>2</sub> Emission Factor <sup>[3]</sup> (kg/gal)	CH <sub>4</sub> Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	N <sub>2</sub> O Emission Factor <sup>[4][5]</sup> (g/vehicle-mile)	CO <sub>2</sub> (metric tons)	CH <sub>4</sub> (metric tons)	N <sub>2</sub> O (metric tons)	CO <sub>2</sub> e <sup>[6]</sup> (metric tons)
Light Duty Vehicles - Laborers (commute)	Gas	0	20	260	-	24.8	-	8.78	0.0079	0.0012	-	0.00E+00	0.00E+00	-
Light Duty Vehicles - Laborers (commute)	Diesel	0	20	260	-	24.8	-	10.21	0.0290	0.0214	-	0.00E+00	0.00E+00	-
Heavy Duty Trucks - Dump Trucks (onsite and offsite)	Diesel	3	20	260	15,600	7.9	1,968	10.21	0.0095	0.0431	20.09	1.48E-04	3.05E-01	100.91
Heavy Duty Trucks - Semis (onsite and offsite)	Diesel	1	20	50	1,000	6.9	145	10.21	0.0095	0.0431	1.48	9.50E-06	1.95E-02	6.66
<b>TOTAL</b>	--	--	--	--	--	--	--	--	--	--	<b>37.74</b>	<b>0.00</b>	<b>0.57</b>	<b>188.25</b>

[1] Based on information in Appendix M of the Joint Permit Application.

[2] Fuel efficiency from 2022 values from U.S. Department of Transportation, Federal Highway Administration, Highway Statistics (Washington, DC: Annual Issues), Table VM-1. <https://www.fhwa.dot.gov/policyinformation/statistics/2022/vm1.cfm>

Vehicle Type	Average Fuel Consumption (miles/gal)
Light Duty Vehicles Short WB 2/	24.85
Single-Unit Trucks	7.93
Combination Trucks	6.91

[3] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Fuel Type	CO <sub>2</sub> Emission Factor (kg/gal)
Motor Gasoline	8.78
Diesel Fuel	10.21

[4] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles, Table 3: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Gasoline Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Gasoline Light-Duty Trucks	2021	0.0079	0.0012

[5] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road diesel vehicles, Table 4: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Diesel and Alternative Fuel Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Vehicle Type	Model Year	CH <sub>4</sub> Emission Factor (g/vehicle-mile)	N <sub>2</sub> O Emission Factor (g/vehicle-mile)
Light-Duty Trucks	2007-2021	0.0290	0.0214
Medium- and Heavy-Duty Trucks	2007-2021	0.0095	0.0431

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Construction Duration:	1.75 years
------------------------	------------

Table 7. Construction Land Use Change GHG Emissions

Temporary Land Use Change <sup>[1]</sup>	Area of Land Change <sup>[1]</sup> (acres)	2022 Net CO <sub>2</sub> Flux for Converted Land Type <sup>[2][3]</sup> (M metric tons CO <sub>2</sub> e)	2022 Total US Land Use Change to Settlement <sup>[4]</sup> (thousands of hectares)	CO <sub>2</sub> e Emission Factor (metric tons CO <sub>2</sub> e/acre)	CO <sub>2</sub> e <sup>[5][6]</sup> (metric tons)
Forest Land to Settlement	46.93	58.6	440	53.90	415.79
Cropland to Settlement	-	2.9	1,228	0.96	-
Wetlands to Settlement	11.75	0.1	14	2.89	5.58
Grassland to Settlement	20.99	7.5	1,648	1.84	6.35
Settlement remaining Settlement	9.12	15.4	43,748	0.14	0.21
<b>TOTAL</b>	<b>88.79</b>	<b>84.50</b>	<b>47,078.00</b>	<b>59.58</b>	<b>427.73</b>

[1] Estimated from development area delineation files and NLCD land cover estimates.

[2]Table 6-51: Net CO2 Flux from Soil, Dead Organic Matter and Biomass Carbon Stock Changes for Land Converted to Grassland (MMT CO2 Eq.), Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[3] Table 6-43: Net CO2 Flux from Soil C Stock Changes in Grasslands Remaining Grasslands, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[4] Table 6-5: Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[5] Emissions are calculated for an assumed 60-day duration of temporary disturbance.

[6] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 8. Operations Emissions from Fuel Combustion Sources

Source <sup>[1]</sup>	Fuel Type <sup>[1]</sup>	Fuel Consumption <sup>[1]</sup> (gallons/year)	CO <sub>2</sub> Emission Factor <sup>[2]</sup> (kg/gallon)	CH <sub>4</sub> Emission Factor <sup>[3]</sup> (g/gallon)	N <sub>2</sub> O Emission Factor <sup>[3]</sup> (g/gallon)	CO <sub>2</sub> (metric tons/year)	CH <sub>4</sub> (metric tons/year)	N <sub>2</sub> O (metric tons/year)	CO <sub>2</sub> e <sup>[4]</sup> (metric tons/year)
Light Duty Vehicle	Gasoline	330	8.78	0.0079	0.0012	2.90	2.61E-06	3.96E-07	2.90
TOTAL	--	--	--	--	--	2.90	2.61E-06	3.96E-07	2.90

[1] Estimated using provided fuel consumption of 1.32 gal/day and 250 operating days/year in Appendix M of the Join Permit Application.

[2] CO<sub>2</sub> emissions calculated using the EPA CCCL emission factors for mobile combustion, Table 2: Mobile Combustion CO<sub>2</sub>, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

	CO2 Emission Factor
Fuel Type	(kg/gal)
Motor Gasoline	8.78

[3] CH<sub>4</sub> and N<sub>2</sub>O emissions calculated using the EPA CCCL emission factors for on-road gasoline vehicles, Table 3: Mobile Combustion CH<sub>4</sub> and N<sub>2</sub>O for On-Road Gasoline Vehicles, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

		CH4 Emission Factor	N2O Emission Factor
Vehicle Type	Model Year	(g/vehicle-mile)	(g/vehicle-mile)
Gasoline Light-Duty Trucks	2021	0.0079	0.0012

[4] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

Table 9. Operation Land Use Change GHG Emissions

Land Use Change <sup>[1]</sup>	Area of Land Change <sup>[1]</sup> (acres)	2022 Net CO <sub>2</sub> Flux for Converted Land Type <sup>[2],[3]</sup> (M metric tons CO <sub>2</sub> e)	2022 Total US Land Use Change to Grasslands <sup>[4]</sup> (thousands of hectares)	CO <sub>2</sub> e Emission Factor (metric tons CO <sub>2</sub> e/acre)	CO <sub>2</sub> e <sup>[5]</sup> (metric tons/year)
Forest Land to Grassland	13.07	46.8	440	43.04	562.49
Cropland to Grassland	-	(12.5)	1,228	(4.12)	-
Wetlands to Grassland	1.53449	0.1	14	2.89	4.44
Grassland remaining Grassland	1.822857	13.4	1,648	3.29	6.00
Settlement to Grassland	1.08	(0.8)	43,748	(0.01)	(0.01)
<b>TOTAL</b>	<b>17.51</b>	<b>47.00</b>	<b>47,078.00</b>	<b>45.11</b>	<b>572.93</b>

[1] Estimated from development area delineation files and NLCD land cover estimates.

[2] Table 6-51: Net CO<sub>2</sub> Flux from Soil, Dead Organic Matter and Biomass Carbon Stock Changes for Land Converted to Grassland (MMT CO<sub>2</sub> Eq.), Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022.

[https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

[3] Table 6-43: Net CO<sub>2</sub> Flux from Soil C Stock Changes in Grasslands Remaining Grasslands, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2022. [https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text\\_04-18-2024.pdf](https://www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf)

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[5] CO<sub>2</sub>e calculated by multiplying the GWP for each pollutant by the potential pollutant emissions. GWPs from EPA CCCL Emission Factors for Greenhouse Gas Inventories, 2024. <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

## **Appendix E**

### **Vegetation Management Plan**





**Vegetation Management Plan**

Stantec Project No: 193708962

February 9, 2024

Prepared for:


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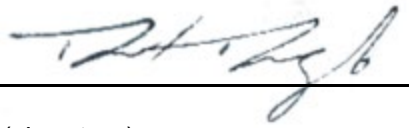
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## VEGETATION MANAGEMENT PLAN

This document entitled Vegetation Management Plan was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Iron Pine Solar Power, LLC (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment considering the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others.

Prepared by   
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**David DeAngelo, Senior Environmental Scientist**



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APPENDIX F	AGRICULTURAL IMPACT MITIGATION PLAN (AIMP)

# Executive Summary

## Introduction

Iron Pine Solar Power, LLC is developing the Iron Pine Solar Project in Pine County, Minnesota (Figure 1). The proposed project area is approximately 2,296 acres. The total acres for the Project are 2,296 acres, with approximately 2,207-acres designated for the Solar Project and a Gen-Tie Line spanning roughly one-mile in length with a ROW width of 160 feet (Figure 2). Iron Pine Solar Power, LLC has developed a Vegetation Management Plan (VMP) to guide vegetation and soil management for the project area from the pre-construction phase through post-construction operation. If approved, the facility would operate under a site permit and route permit issued by the Minnesota Public Utilities Commission. The VMP covers site preparation, installation of seed materials, management activities during the vegetation establishment and maintenance phases along with annual monitoring.

Land use within the proposed project area is primarily row-crop agriculture. As a result of the construction of the Iron Pine Solar Project, based off of the preliminary design, more than 1,560 acres will be converted and/or managed for perennial, regionally appropriate vegetation for the course of the permit lifetime (approximately 30 years). Areas to be converted to perennial vegetation include all areas within facility fence lines including underneath and between panels and areas outside perimeter of the facility fence lines within the Project Area that will not continue to be used for agricultural production and excluding areas that already consist of perennial vegetation.

For the purpose of this VMP, “regionally appropriate” was defined as having one or more of the following characteristics:

- Native to the region and the state prior to large scale agricultural development.
- Commonly occurs within the landscape of the project area and is not considered to have invasive plant species characteristics that can negatively impact existing plant communities.
- Not listed by the Minnesota Department of Agriculture as a Noxious Weed.

The VMP sets vegetation goals and provides guidance on steps recommended and required to achieve goals in a manner that are consistent with regulatory standards, economic and operationally feasible, and provides environmental benefits. The VMP will be used for internal communication between teams and contractors as a guide and reference document to successfully achieve the vegetation goals for the Iron Pine Solar Project.

The site has three goals for vegetation including 1) establishing low-growing, regionally appropriate grasses 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 Vegetation Establishment and Management Plan Overview

## 1.1 Introduction

Iron Pine Solar Power, LLC (Iron Pine Solar) is developing the Iron Pine Solar Project (Project) in Pine County, Minnesota (**Figure 1**). The proposed Project Area is approximately 2,296 acres. Of the 2,296 acres, approximately 1,560 acres are currently designated as a possibility to host proposed Project facilities (**Figure 2**). Iron Pine Solar has developed this Vegetation Management Plan (VMP) to establish and maintain vegetation at the Iron Pine Solar Project in a manner that allows for safe and reliable solar energy generation while providing environmental benefits during operation of the Project. Iron Pine Solar will apply for a site permit for the Project from the Minnesota Public Utilities Commission. The purpose of the VMP is to provide goals and guidelines for successfully establishing and maintaining vegetative cover within the Project Area for the life of the Project.

The VMP was developed during the Project planning phase for the Iron Pine Solar Project using the most current information available. The VMP 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 that provides for better management of the Project's vegetation. Upon completion of final construction, the VMP will be reviewed and updated to reflect final construction conditions.

The site has three goals for vegetation including 1) establishing low-growing, regionally appropriate grasses 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 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 VMP.
- Use maintenance practices that are consistent with typical industry standard practices including periodic mowing and spot herbicide treatment.
- Establish as many acres of perennial 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.

## VEGETATION MANAGEMENT PLAN

### 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 native plant communities through site evaluation and mapping, implementation of best practices during construction, revegetation in accordance with practices outlined in the VMP 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 A**, 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 VMP, which uses pre-dominantly regionally appropriate 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 adjacent native plant communities and wetlands from impacts due to facility construction and operation.
  - Avoid disturbance to all native plant communities and wetlands outside of the perimeter fence.

## **VEGETATION MANAGEMENT PLAN**

- 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 7.6.
- 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 VMP including pre-construction through monitoring and maintenance period activities will be completed by qualified vegetation management professionals. For the purposes of the VMP 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.

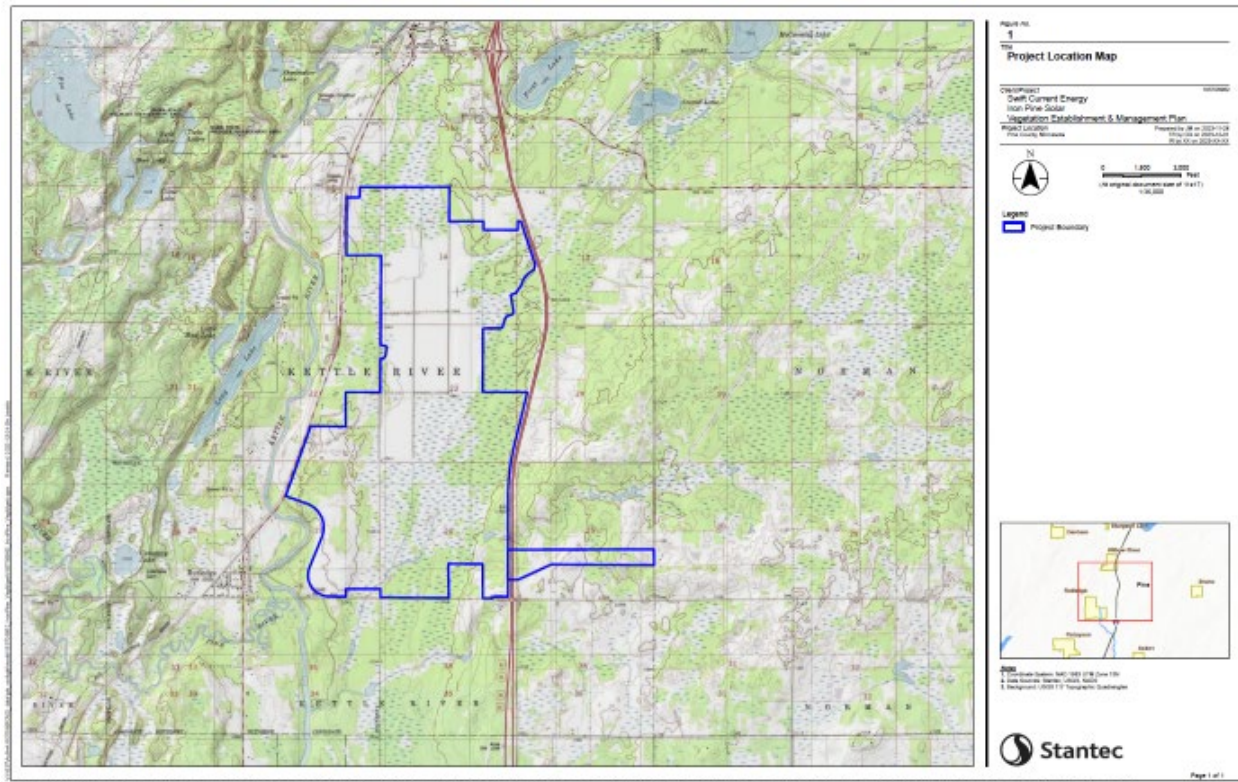
Qualified vegetation management professionals may be internal staff from Iron Pine Solar future facility owners, facility operators, or hired contractors. Likely over the course of the lifetime of the Project, it will be a combination of multiple entities implementing one or more portions of the VMP. The role of the VMP 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 Site Description

### 2.1 Project Location and Description

The Project is located in Section 13, 14, 15, 22, 23, 24, 25, 26, 27, Township 44, North Range 20 West, in Kettle River Township, Pine County, Minnesota as shown in **Figure 1**. The City of Rutledge, Minnesota is located approximately 0.5 miles west of the southwestern boundary, and the City of Willow River, Minnesota is located approximately one mile north of the northern boundary of the Project area.

Figure 1. Site Location Map



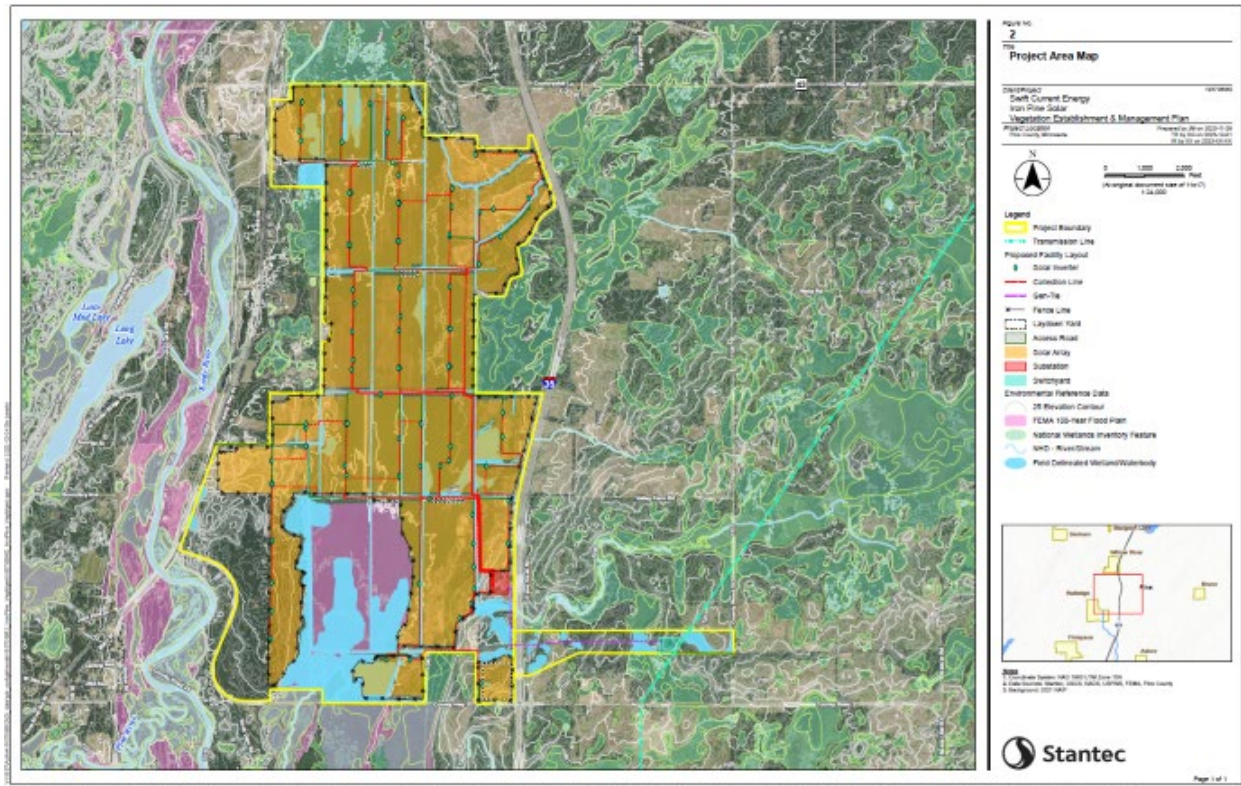
The solar facility will occupy the portion of the Project Area that is west of Interstate 35 and the Gen-Tie Line project area will commence from a Project Substation within the solar facility area adjacent to the west right-of-way. A single-axis tracking system will allow the solar panels to track the sun from east to west maximizing energy production. Energy from the solar panels is directed through an underground electrical collection system to inverters where the power is converted from direct current to alternating current power. The power is then transmitted to a step-up transformer located at the Project substation from 34.5 kilovolt (kV) to 230 kV. The Solar Project will interconnect to the grid via a proposed approximately 1-mile long aboveground 230-kV transmission line and associated facilities that is needed to interconnect the solar Project's collector substation to the point of interconnection to the grid at Minnesota Power's Arrowhead-Bear Creek 230 kV transmission line. Solar panels will be accessible via a network of gravel access roads for maintenance purposes, and the portions of the Project occupied by equipment will be surrounded by security fencing. Stormwater from the site will be managed through a series of planned stormwater ponds and drainage swales.



## VEGETATION MANAGEMENT PLAN

Subject to final design, solar arrays and Gen-Tie Line will be laid out generally as depicted on **Figure 2** and in a manner that minimizes site grading and length of underground collection; avoids various constraints, including wetlands; and maximizes energy production. Subject to final design, the site and grading plan for the Project is shown in **Appendix A**.

Figure 2. Project Area Map



## 2.2 Project Size and Boundary Description

Within the Project Area, the solar array area will comprise approximately 2,207 acres, of which approximately 1,537 will be comprised of solar equipment. Within the Project Area, the Gen-Tie Line area will comprise approximately 89 acres, of which approximately 24 acres will be maintained for the right-of-way, **Figure 2**. The project is surrounded by agricultural, forested, and rural residential areas. The site is intersected by I-35 on the east, bordered on the west by CTH 61, on the south by County Road 33/Swanson Rd, and on the east by CTH 152, or Valley Farm Rd.

## 2.3 Historic and Current Vegetation and Land use

### Historic Vegetation and Land Use

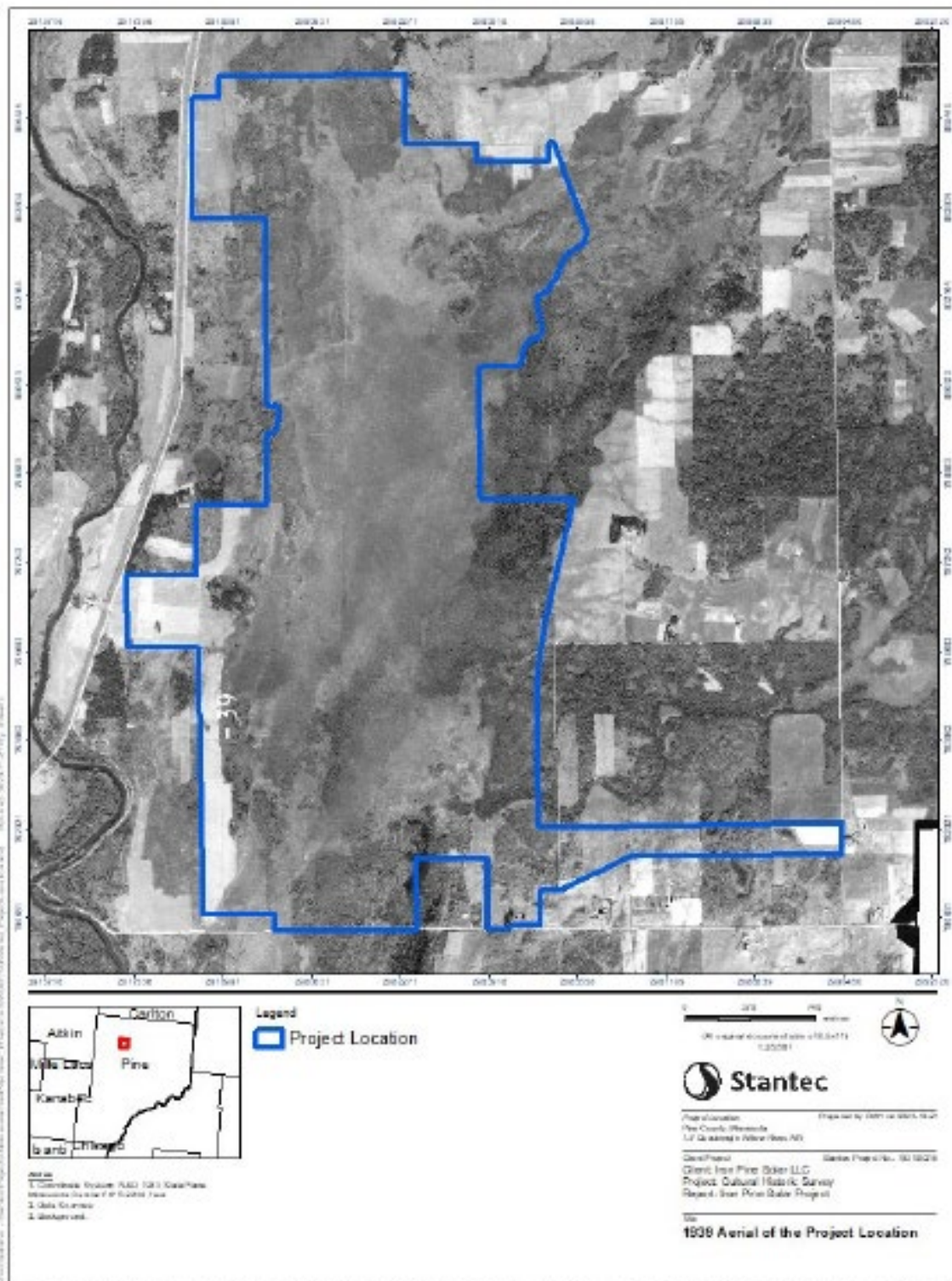
According to the MNDNR Ecological Classification System, the Project Area is within the Mille Lacs Uplands (212Kb) Subsection of the Western Superior Uplands Section of the Laurentian Mixed Forest Province. Within the vicinity of Project Area, a mix of conifer, hardwood and mixed conifer-hardwood forests and peatland areas inhabited by sedge-fen, black spruce-sphagnum, or white cedar-black ash communities were the historic vegetative cover of the Project Area prior to agricultural land conversion in the late 1800's.

## VEGETATION MANAGEMENT PLAN

According to the Natural Resources Conservation Service (NRCS) Land Resource Region and Major Land Resource Area (MLRA), the Project is located in the Northern Lake States Forest and Forage Region and the Wisconsin and Minnesota Thin Loess and Till (USDA, 2022). LLRs are a group of geographically associated major land resource areas, and MLRAs are geographically associated land resource units. This MLRA is part of the recently glaciated till and outwash plains. This area was covered with loamy alluvium or loess after glaciation. Lakes, ponds, and marshes are common throughout the area, and streams generally have a dendritic pattern (USDA, 2022).

The University of Minnesota's online collection of aerial photographs includes aerial images of this site in 1939 and 1965. Historic Aerials ([historicaerials.com](http://historicaerials.com)) includes aerial images of this site in 1952, 1957, 1977, and later years. The 1939 photo shows this land with only a few small areas of trees, see **Figure 3**. There are no significant changes to be seen on the 1952, 1957, and 1965 aerial views, which all show the land remaining in a similar state. Notably, construction of I-35, which defines portions of the eastern edge of the project site as shown in the 1965 aerial view, was first authorized in 1956 and is depicted as under construction on the 1961 USGS Topographic Map for Moose Lake, MN, Quadrangle. This 1961 Topographic map also shows the bulk of the project area as marshland, just as it was when first surveyed in 1864. The 1977, 1981, and 1988 aerial photographs show the bulk of the center of the project area used for agriculture (with drainage ditches then present), and the 1981 topographical map for Willow River shows a matching decrease of marshland area. This agricultural area later expanded to the south, as shown on the 1991 aerial view, and to the north, as shown on the 2003 aerial view.

Figure 3. Historical Aerial from 1939



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### Current Vegetation and Land Use

The Project Area is within the St. Croix Major Watershed Basin, which includes four subwatersheds: St. Croix River-Upper, Kettle River, Snake River, and St. Croix River-Stillwater. The project is located within the watershed of the Kettle River which is approximately 0.15 mile west of the Project Area at its closes point. The Kettle River is in the Minnesota Wild and Scenic River system. The Kettle River is designated as Scenic from the Carlton-Pine county line downstream to the Kettle River dam site at Sandstone. Scenic rivers are those rivers that exist in a free-flowing state and with adjacent lands that are largely undeveloped (i.e., adjacent lands still present an overall natural character, but in places may have been developed for agricultural, residential, or other land uses.)

Several agricultural drainage ditches bisect the portion of the Project Area west of Interstate Highway 35. The agricultural drainage ditches in the northern portion of the project Area flow generally north and west and the ditches in the southern portion flow generally south and west. One stream is crossed by the transmission line and is a Minnesota Public Waters Inventory (PWI) mapped waterway (Unnamed Stream M-050-046-023-001). All ditches and the stream discharge to the Kettle River.

The existing vegetative land cover within the solar array area and Project Substation is cultivated cropland currently planted in soybeans and a network of agricultural drainage ditches. Vegetation within the transmission line corridor and switchyard consists of mixed hardwood forest, wetlands including forested, shrub, and emergent types, and hay/pastureland. Secondary vegetative communities in the immediate area include Interstate Highway 35 right-of-way, smaller utility rights-of-way, farmsteads, and residential vegetated areas to the west along County Highway 61.

A wetland and waterway delineation field assessment was completed in September 12-16, September 19-21, and October 31, 2022 and approved by the Wetland Conservation Act (WCA) Technical Evaluation Panel (TEP) June 16, 2022 and by the U.S. Army Corps of Engineers on August 23, 2023. Forty-two wetlands (**Table 5**), four waterways and 26 channelized human-made ditches (**Table 6**) were delineated and mapped within the Project Area. Delineated wetlands and watercourses are shown on **Figure 2**. The Project has been designed to avoid temporary and permanent impacts to wetlands.

The Project is located within a rural landscape, and therefore the primary land use in the Project Area is agricultural (75.5%). The second largest portion of the Project Area consists of harvested timber (12%). The remaining identified land uses include deciduous forest, emergent herbaceous wetlands, barren land, and open water. In total, the remaining land uses comprise (8%) percent of the Project Area. Most of the agricultural land in the Project Area is subject to row-crop agriculture, such as corn and soybeans. Approximately 74 acres of the array area in the southwest corner is recently harvested timber, along with an additional 174 acres of harvested timber that will be revegetated to pollinator habitat. Developed land within the Project Area generally consists of public roads, namely County Highway 61, Swanson Road, Weeping Willow Road, Cane Creek Road, and Interstate Highway 35. Land use within the Project Area, based on U.S. Geological Survey National Land Cover Database (NLCD) mapping, is summarized in **Table 1** and a map is provided in **Figure 4**.

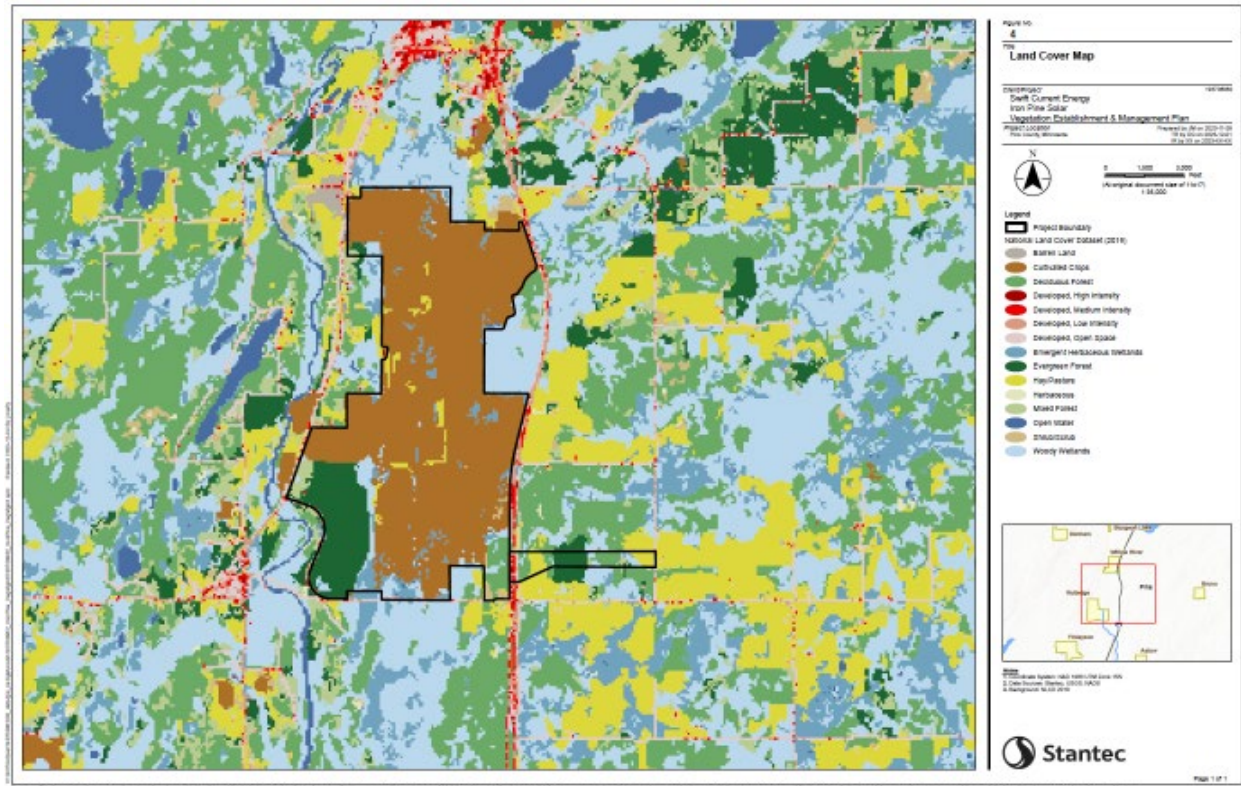


## VEGETATION MANAGEMENT PLAN

Table 1. NLCD Mapped Land Use within the Project Area

Land Use Type	Acres in Project Area	Percent Total Acreage
Agricultural	2,026	92%
All other land uses	178	8%
<b>Total</b>	<b>2,207</b>	<b>100%</b>

Figure 4. Land Cover Map



Farmsteads are sparsely scattered outside of the Project Area, generally situated near public roads. Based on review of available aerial photography, there are 34 residences located on parcels adjacent to the Project Area.

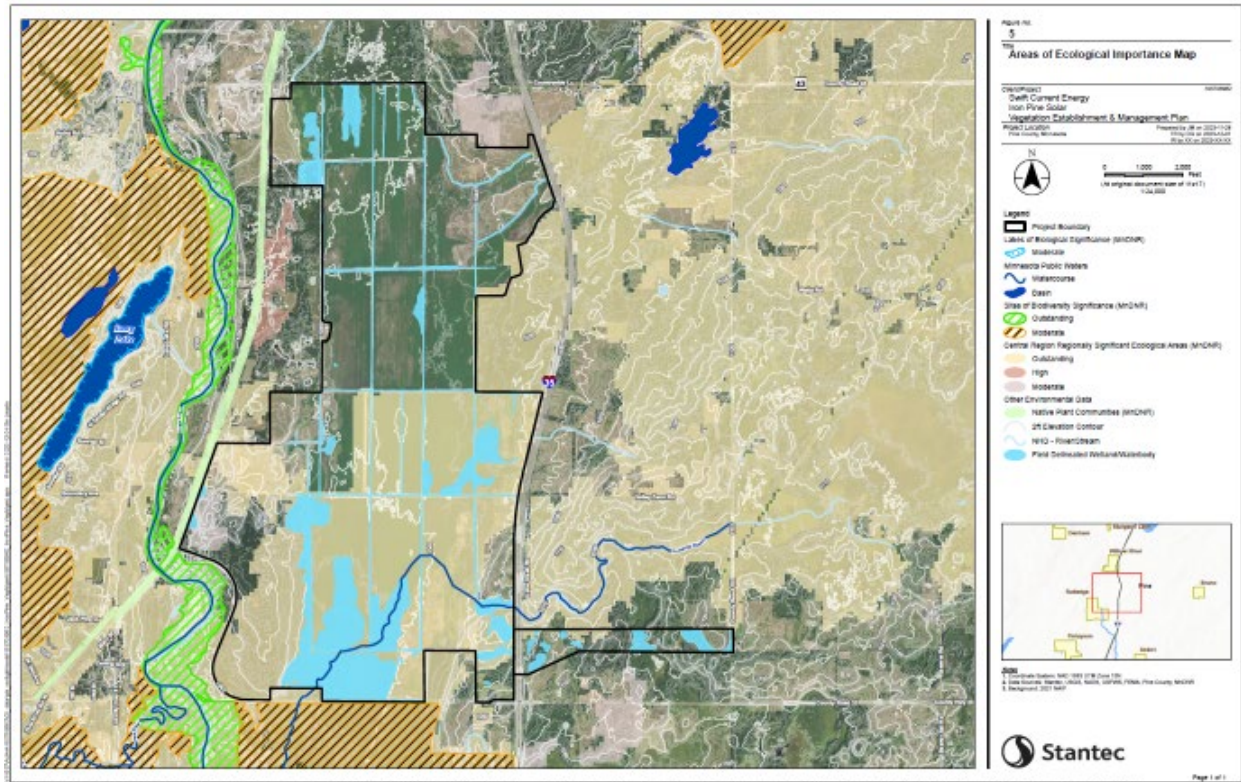
Locations of potential areas of ecological importance are shown in **Figure 5**. There are no MBS Sites of Biodiversity Significance (SBS) located within the Project Area, however there are two areas adjacent to the Project Area which have been identified as SBS. An Outstanding ranked SBS site associated with the Lower Kettle River west and south of the Project Area, and Banning North, a Moderate ranked SBS, is located south of the Project Area.

The DNR describes native plant communities as a group of native plants that are not greatly altered by modern human activity or introduced organisms and are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes including wildfires and floods (DNR 2024h). There are no MN designated NPC located within the Project Area. However, there is one

## VEGETATION MANAGEMENT PLAN

NPC, a Dry Barrens Oak Savanna (Southern) Jack Pine Subtype (UPS14a1) located directly adjacent to the west side of the Project Area and running alongside County Road 61. There is no remnant native prairie present within the Project Area. No CREP or RIM parcels or other conservation easements or land enrolled in government conservation programs known to be present within the Project Area.

Figure 5. Potential Areas of Ecological Importance

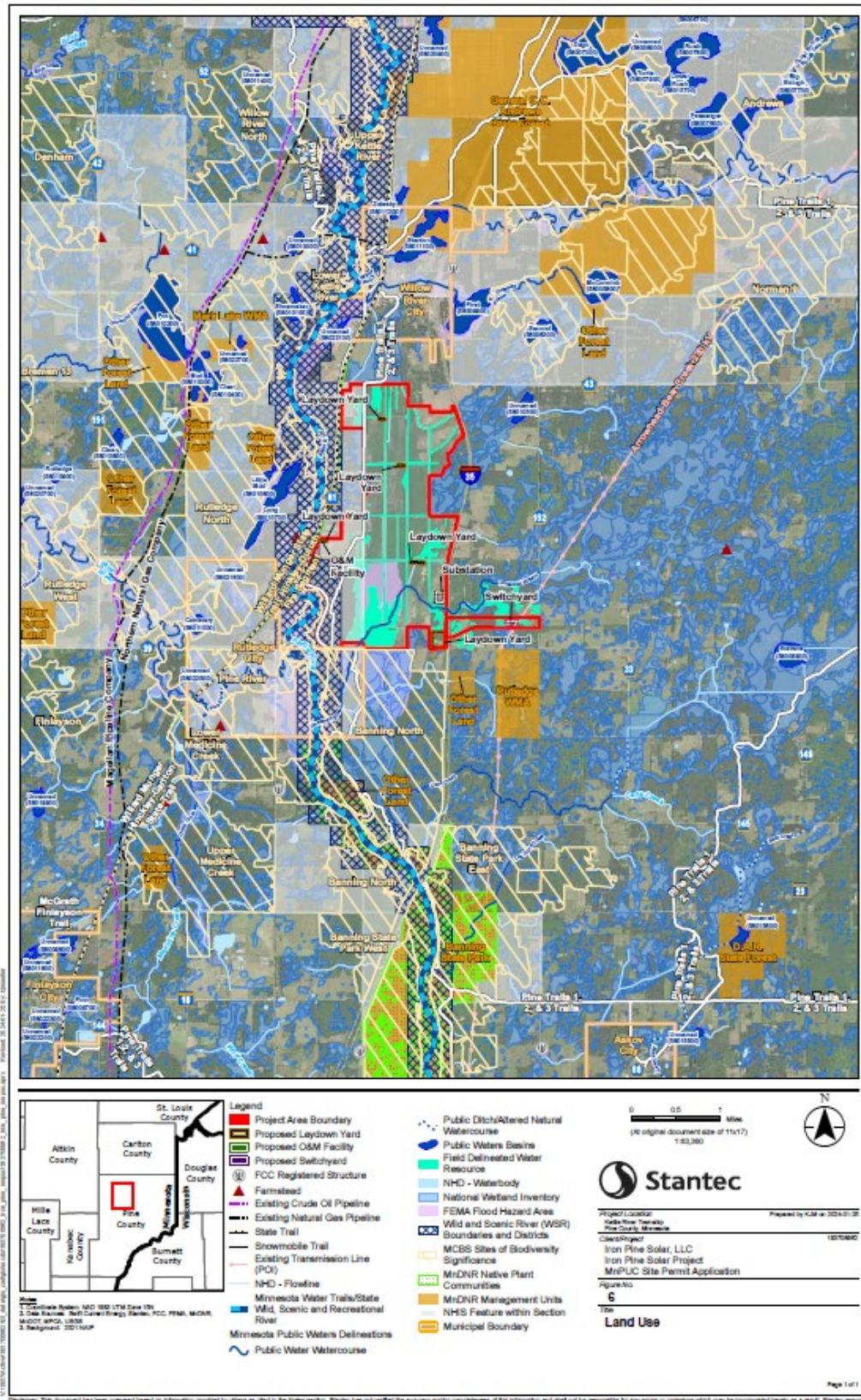


There is no public land including recreation or public conservation areas (ex. WMAs, SNAs, etc.) located within the Project Area. Public land located within a mile of the Project Area includes Rutledge WMA and state forest land parcels. The Willard Munger Hinckley-Carlton State Trail is located adjacent to the west side of the Project Area and a State Water Trail follows the Kettle River, also located west of the Project Area. Public lands in the vicinity of the Project are shown in Figure 6.



# VEGETATION MANAGEMENT PLAN

Figure 6. Land Use



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### 2.4 Topography

The Project Area is in a relatively flat area with ground surface elevations typically between 1,040 feet above mean sea level (ft amsl) and 1,050 ft amsl. The southeastern portion of the Property, east of Interstate 35, has a ground surface elevation of up to 1,100 ft amsl (USGS, 2019a and 2019b). The solar array area is a relatively flat basin with topographic highs sloping upward along both the eastern and western boundary of the site. Drainage within the solar array area north of Valley Farm Road is directed to the north to the Kettle River, and drainage south of Valley Farm Road is directed south to the Kettle River. The topography along the proposed transmission line is gently rolling with drainage flowing north and west to an unnamed stream which flows to the Kettle River. Existing two-foot contours are shown in **Figure 2**.

### 2.5 Soils

Note that soils on a majority of the site were not classified by NRCS because NRCS was denied access at the time of the soil survey or no digital data is available (**Figure 7**). During Stantec's field delineation, it was found that a large portion of the site contained drained peat soils, particularly in the farmed areas. The soils deposited in the area are characteristic of glacial and post glacial activity. Planting zones and seed mixes were developed using observations from on-site fieldwork, aerial and historical photographs, and descriptions of adjacent soil types. Soils, underlying bedrock formations and other geologic features were identified during desktop evaluations using applicable GIS layers for nearby soil types. Susceptible geologic features, including karst, sinkholes, shallow limestone formations, or unconfined/shallow aquifers are not known to be present in the vicinity of the Project Area. The depth to bedrock ranges from less than 50 to greater than 100 feet throughout the Project Area. Bedrock depth is shallowest in the central portion of the Project Area and increases on the east and west (Setterholm, 2001). SSURGO data from the surrounding area suggest the depth to bedrock within the entire Project Area is greater than 200 cm (78.7 in).

The Project Area resides over the Mesoproterozoic bedrock unit designated "Mss- Sandstone, siltstone, and local conglomerate" (Minnesota Geological Survey, 2011). This unit includes the Hinckley Sandstone and Solar Church and the youngest (~1,000 million years ago) detrital zones of the Fond du Lac Formations. The formations originate from deposition in eolian, fluvial, and lacustrine environments.

The project area contains three major quaternary geological units (Minnesota Geological Survey, 2019). They include:

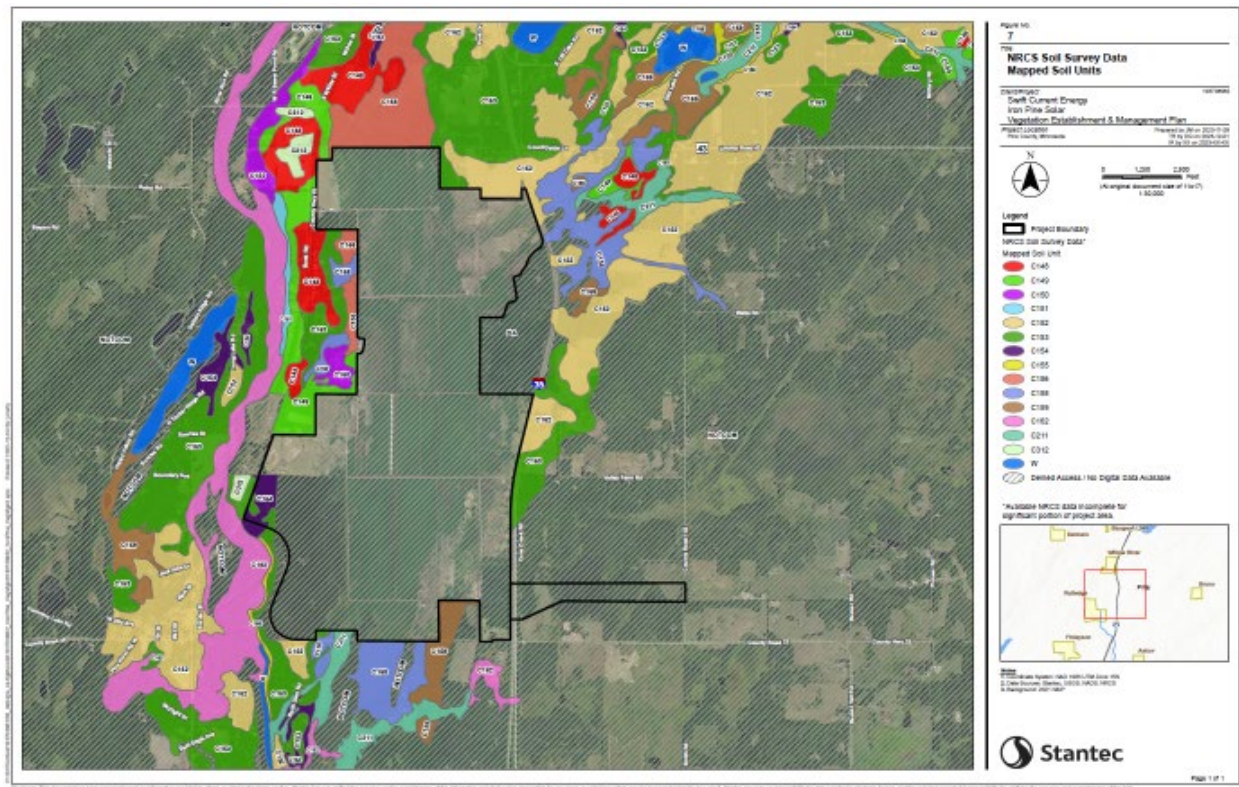
- Floodplain Alluvium (al)-Gravelly sand to sandy silt; generally coarse-grained sediment (sand and gravel) in channels, and finer-grained sediment (fine-grained sand and silt) on floodplains. Deposited by modern streams.
- Barnum Formation, Mahtowa member [Split Rock phase] (bh)- loamy diamicton, red. The Barnum Formation was deposited by ice of the Superior lobe from the northeast, Superior provenance. The "h" letter designates stagnation-moraine sediment. Meaning the glacial sediment deposited at the margin of a glacier or released by the melting of glacial ice. This is composed of till, stratified glacial sediments, and glaciolacustrine sediment. These areas also form broad areas of hummocks, irregular topography, including circular, flat-topped hills, and collapsed channels.
- Cromwell Formation Outwash (cro)- Outwash from the Cromwell Formation, which was deposited



## VEGETATION MANAGEMENT PLAN

by ice of the Superior lobe from the northeast, Superior provenance.

Figure 7. NRCS Soil Survey Data



Soils were characterized as hydric throughout the Project location during the wetland delineation conducted for the Project. Wetlands are associated with some of these areas (**Figure 2**), however other areas appear to be effectively drained by agricultural practices. There are no known springs or seeps at the site. None of the soils are classified as Prime farmland within the Project boundary. NRCS Soil Survey Soil Drainage Classification and Hydric Soils mapping is shown in **Figure 8** and **Figure 9**.

The primary constraint, for the purpose of vegetation, is soil moisture. Soils associated with the Iron Pine Solar Project tend to be poorly or somewhat drained in the interior portion of the site with well drained or excessively drained soils on the perimeters on the east and west side of the Project. 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.



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Figure 8. NRCS Soil Drainage Classification

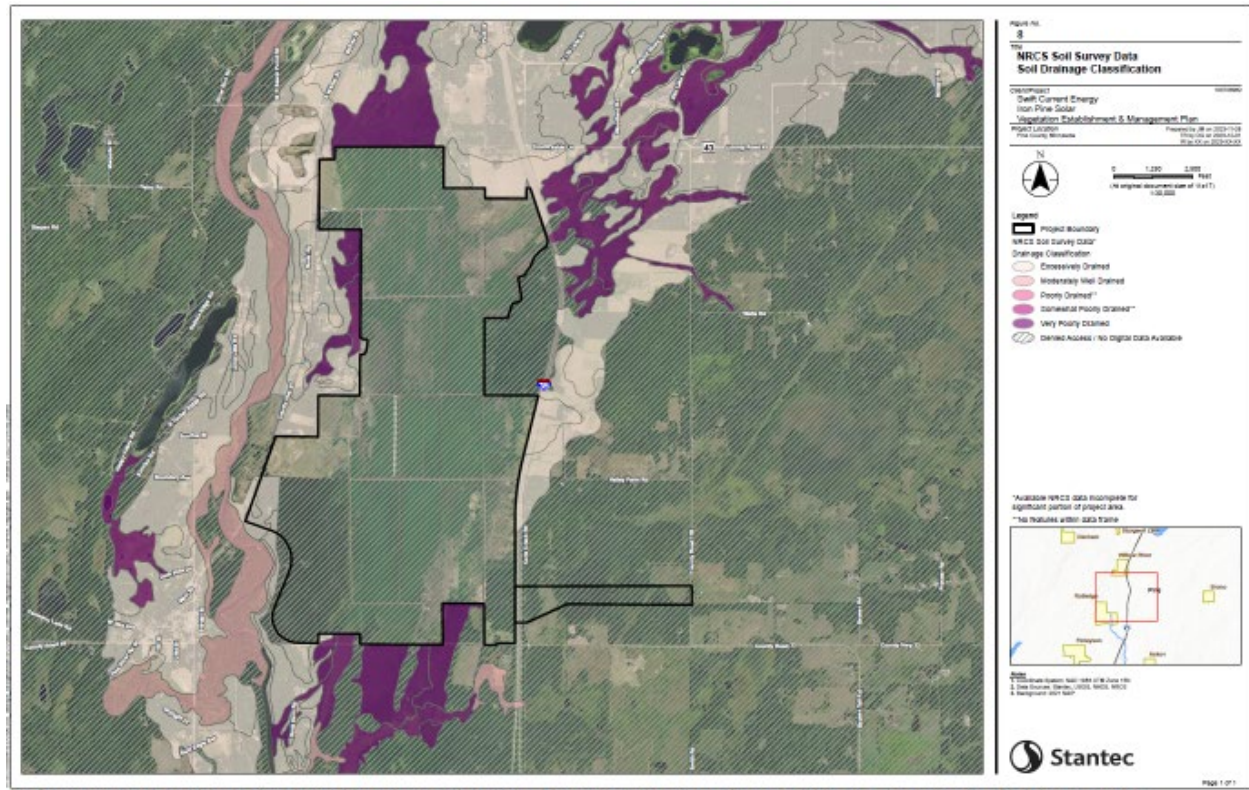
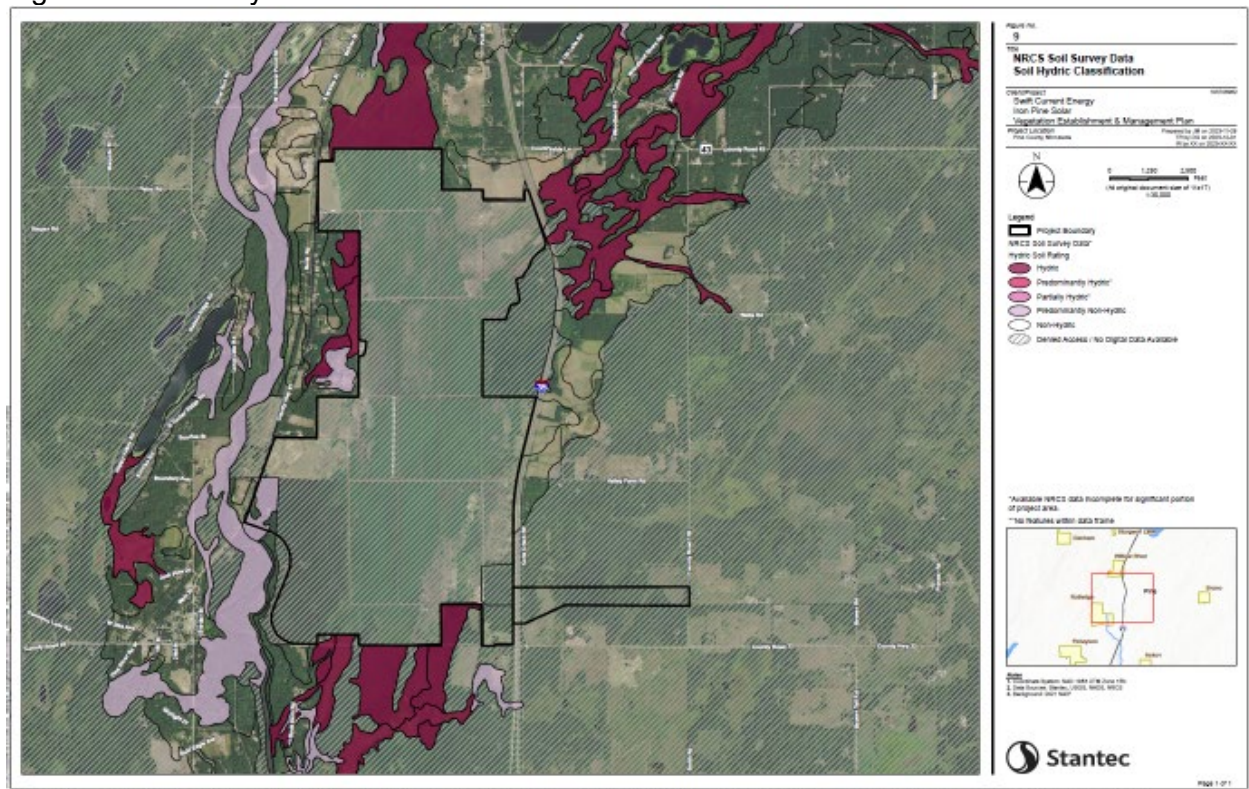


Figure 9. NRCS Hydric Soil Classification



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Soil drainage and water holding characteristics are considered for seed mix design. While some soils are artificially drained by agricultural ditches, natural soil characteristics likely still sustain mesic to moist-mesic soils. Likewise, compaction during construction will also decrease drainage efficiency and increase water holding capacity, favoring species adapted to higher moisture conditions. In general, moist soils, along with a potential legacy of agricultural fertilizers, encourage robust vegetation growth. Based on existing soil drainage characteristics, past land use, and anticipated soil hydrology impacts following Project construction, three low growing solar array seed mixes have been designed that includes species that are compatible with the diversity of drainage characteristics across the site as described. These mixes are provided in **Appendix B, Table B.2, B.3, and B.4.**

**Table 2. Soil Characteristic Constraints Over Vegetation**

Vegetation Hydric Types	Drainage Characteristics	Modal Species	% Cover
Moist Mesic to Mesic Vegetation	Moderately to poorly drained High to moderate water holding	Marsh Bluegrass ( <i>Poa palustris</i> ) <sup>1</sup> Blue-joint Grass ( <i>Calamagrostis canadensis</i> ) <sup>3</sup> Big Bluestem ( <i>Andropogon gerardii</i> ) <sup>3</sup>	93%
Mesic Vegetation	Moderately well drained Moderate to low water holding	Big Bluestem ( <i>Andropogon gerardii</i> ) <sup>3</sup>	2%
Mesic to Dry Mesic Vegetation	Well drained to Excessively drained Low water holding capacity	Side Oats ( <i>Bouteloua curtipedula</i> ) <sup>1</sup> Little Bluestem ( <i>Schizachyrium scoparium</i> ) <sup>2</sup>	10%
<sup>1</sup> Native and highly suitable for site specific array seed mix.			
<sup>2</sup> Dominate historic vegetation, but too tall for solar purposes.			

## 2.6 Hydrology

The Project is located in the Kettle River Watershed Basin. One unnamed MNDNR Public Watercourse is located in the northwest corner of the Project Area. It is classified as a natural perennial watercourse. This feature is also indicated as a Flowline in the National Hydrography Dataset (NHD).

Field investigations were performed September 12-16, September 19-21, and October 31, 2022. Boundary concurrence on the delineated wetlands and waterways was provided by the WCA LGU, which is Pine County, in their Notice of Decision (NOD) dated June 8, 2023. The U.S. Army Corps of Engineers provided concurrence with the delineated aquatic resources on August 23, 2023. A total of 42 wetlands, and one excavated open water feature (**Table 3**) and four waterways and 26 channelized human-made ditches (**Table 4**) were delineated and mapped within the Project Area and the immediate vicinity. Delineated wetlands and watercourses are shown on **Figure 2**. See the Site Permit Application for more information on wetland impact avoidance and minimization measures. Wetland types and acreages and waterbody types and linear feet are summarized in **Table 3** and **Table 4** respectively.

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**Table 3. Delineated Wetlands Within and Immediately Adjacent to the Project Area**

Wetland Type	Acres within Project Area
Farmed Wetland	163.8
Floodplain Forest	8.0
Hardwood Swamp	14.6
Sedge Meadow	0.4
Shrub-Carr	46.1
Wet Meadow	13.7
<b>Total</b>	<b>246.7</b>

**Table 4. Delineated Watercourses within the Project Area**

Waterway ID	Flow Class	Length In Study Area (linear feet)
<b>Streams</b>		
S1	Perennial	2,566.5
S3	Perennial	3,952.6
S4	Perennial	2,894.8
S7	Perennial	6,797.7
<b>TOTAL</b>		<b>16,211.6</b>
<b>Agricultural Drainage Ditches</b>		
D1	Ephemeral	471.3
D2	Ephemeral	33215.5
D3	Ephemeral	9227.0
D4	Ephemeral	364.6
D5	Ephemeral	485.6
D6	Ephemeral	1387.9
D7	Ephemeral	1046.5
D8	Ephemeral	1927.9
D9	Ephemeral	1477.6
D10	Ephemeral	1644.26
D11	Ephemeral	11287.9
D12	Ephemeral	1180.6
D13	Ephemeral	1830.2
D14	Ephemeral	2382.9
D15	Ephemeral	125.3

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Waterway ID	Flow Class	Length In Study Area (linear feet)
<b>Streams</b>		
D16	Ephemeral	1715.7
D17	Ephemeral	4017.4
D18	Ephemeral	559.1
D19	Ephemeral	865.5
D20	Ephemeral	5111.1
D21	Perennial	3660.7
D22	Perennial	587.9
D23	Perennial	2546.2
D24	Perennial	2888.5
D25	Perennial	191.7
D26	Perennial	11315.7
<b>TOTAL</b>		<b>101,514.6</b>

### 2.7 Drain Tile

Iron Pine Solar has had discussions with the participating landowner and understands that drain tiles are minimal in this area. 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. Iron Pine Solar will review available drain tile maps from participating landowners with land in the Project Area. Iron Pine Solar will attempt to avoid and/or relocate existing drainage systems as needed for construction of the Project. Drain tile or drainage system 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 leased property. New or modified drain tile systems installed by Iron Pine Solar will be located using Global Positioning System equipment and archived in Project construction files and the Project Decommissioning Plan.

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.

Iron Pine 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

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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, Iron Pine 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.

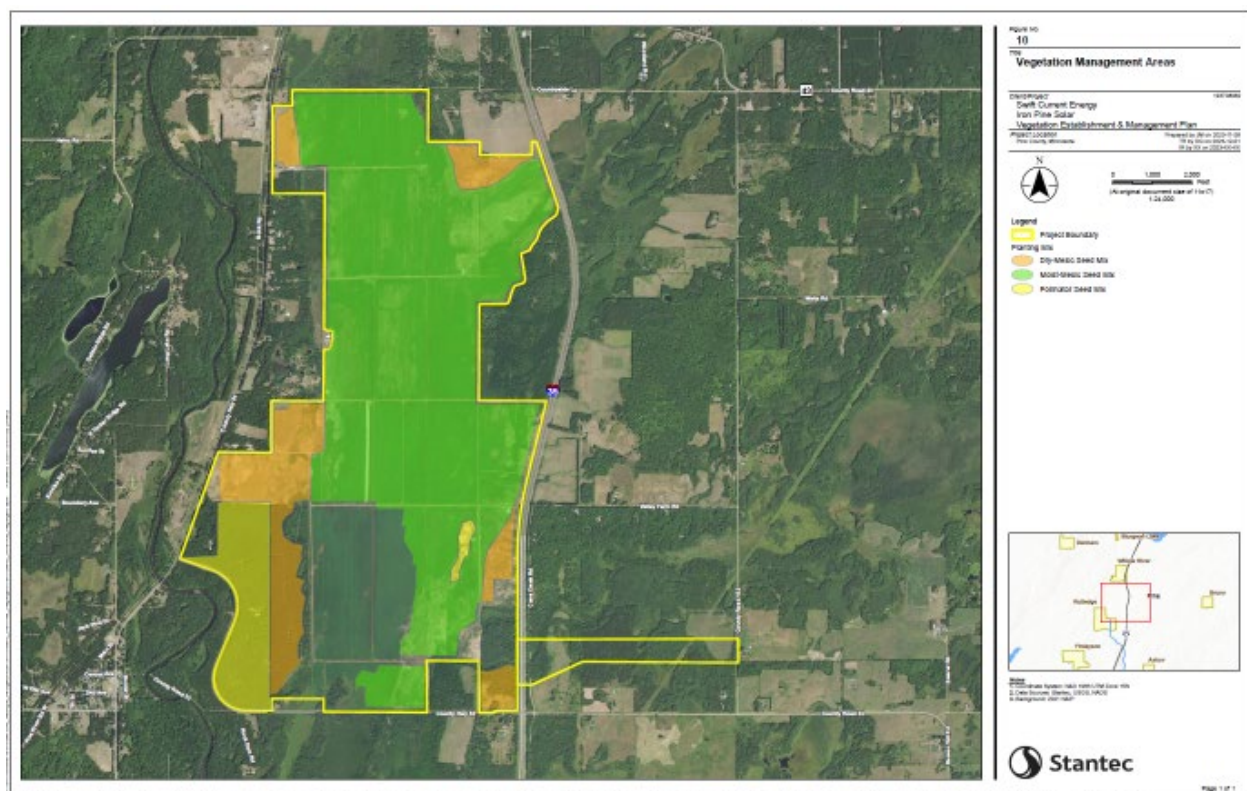


## 3 Vegetation Management

### 3.1 Management Areas

The Iron Pine Project area consists of one main continuous block of panels with two small separate fenced in areas on the south. Due to the large majority of the units being continuous, management units across the site have been defined by the vegetation type specified for installation. They break into three broad categories including Moist-Mesic Array Low Grow, Dry-Mesic Array Low Grow, and Pollinator. Differing hydrological and vegetative conditions will require slightly different management sequencing. **Figure 10** shows a representation of the management areas. Descriptions of the steps to establish and maintain the management areas are included in the following sections.

Figure 10. Vegetation Management Areas



Moist-Mesic Array Low Grow vegetation unit are in sandy or peat soils with a high-water table. Water availability is expected to be high and is not anticipated to be a limiting factor in growth. This management unit is indicated in green on **Figure 10**. Moist-Mesic Array Low Grow vegetation unit is primarily agricultural recently planted to corn and beans.

Dry-Mesic Array Low Grow vegetation unit has well drained to excessively drained sandy soils. Water availability may be a factor in overall growth and they maintenance treatment sequencing. Indicated in Orange on **Figure 10**. Dry-Mesic Array Low Grow vegetation was also primarily agriculture planted to corn and beans with the exception of the southeastern fenced units that was partially agriculture and partially forested.

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Pollinator plantings fall within a recently harvested timber lot. The soils are well drained and sandy, and the differing previous land use indicates different starting conditions that will require alternate seedbed preparation, installation and weed management steps to successfully establish.

### 3.2 Vegetation Management Objectives

Vegetation management objectives have been developed for the pre-construction/construction phase, as well as short-term establishment and long-term establishment for the Project Area.

#### Pre-construction/Construction Phase Objectives

Pre-construction is defined as the period that begins when Iron Pine 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 12-18 months and is anticipated to begin for the Project in Q3 2025, with expected completion by early 2027.

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 Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils, or Pollinator 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 (Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils, or Pollinator Mix), **Appendix B, Tables B.2, B.3, and B.4** will be used in the locations shown in **Figure 10**. 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 6 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.2
- At least 30% of the total seeding rate should be composed of perennial forbs.



## VEGETATION MANAGEMENT PLAN

- 5 or more native grass/sedge species with at least 2 species of bunchgrass.
- 10-15 or more native forbs with at least 3 species in each bloom period: Early (April-May), Mid (June-August), and Late (August-October).

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 Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils or Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils in the locations as shown in **Figure 10** 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 Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils or Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils 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 5** 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.

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**Table 5. 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 8** and **9** in Section 4.5 for a list of invasive and potentially 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 low-growing wet mesic 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.

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- 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 Site Preparation and Seasonal Timing

The placement of the seed mix will be refined once the site design has been finalized, but the general approach to the installation of the planting mixes based on the current design is provided. Installation timing, construction sequencing, and site conditions at the time of installation play a large role in determining the correct steps required for successful installation. At the time of this writing, the construction sequencing is not fully developed for a detailed seeding schedule to be outlined. The proper steps to take upon development of the construction sequencing can, however, be outlined. The purpose of this section is to describe the appropriate steps for a given condition to cover a wide range of scenarios that may occur during project development and provide the steps necessary should those conditions occur.

The Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils or Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils will be installed in fenced areas and perimeter areas outside of the fence that require permanent vegetative cover (**Figure 10**). There will be no planting on the internal access roads, the substation, switchyard, or operation and management facility areas, along public road ROWs, or in areas identified as streams or wetlands where existing vegetation is present. State of Minnesota Seed Mix 33-261 Stormwater South and West Mix for vegetation of permanent stormwater ponds and a Pollinator Seed Mix for use in perimeter areas is provided in **Appendix B**.

#### 4.1 Site Preparation

Any site preparation should maintain compliance with the SWPPP (**Appendix E**). Whether the Project requires soil preparation is dependent on preceding land use and construction activities. Typically, no site preparation is required when the preceding vegetation has been soybeans, small (cereal) grains (oat, wheat, barley, cereal-rye), or forage crops such as alfalfa or corn silage. Harvested soybean, small (cereal) grains, and forage fields provide a low crop residue, level ground, and perfect soil firmness to seeding all seed mixes associated with solar. The Plan advises working in advance with the current land manager to accommodate above mentioned crops. If site preparation is required, it may consist of removing existing biomass by haying or herbicide, and or disking, harrowing, and soil-packing to assist with installation and establishment of seed mixes.

While harvested soybean, small grains, and hayed or chopped forage crop fields require little or no site preparation, other crops, such as corn, unharvested small grains, unharvested forage crops, and weedy fallow fields may create excessive vegetation residue and soil compaction that will hinder seeding and seeding establishment. If site preparation is required, it may consist of a variety or combination of crop residue reduction methods, including haying, mowing, chemical burn down by herbicide (glyphosate), and or shallow tilling. Excessive soil compaction is often associated with corn fields and soil decompaction by shallow tilling may be required to create a viable seedbed. Fallow fields often exhibit annual weeds that can be chemically treated by glyphosate and or mowing, but in either case, treatment needs to occur before weeds produce seed.

If tillage is required, caution is advised to avoid tilling too deep. While deep tillage reduces soil compaction, it can create soils too loose for seeding native species. Grass seed may not establish if seeded deeper than 1/2 inch and many native forbs may not establish if seeded deeper than 1/8 inch. Most agricultural crops germinate from large seeds that can be planted much deeper than grass seed. Therefore, most agricultural tillage implements tend to cultivate soil too deep for grass seed. If soil

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preparation involves deep tillage, it is advised soils are firmly packed before seeding.

Site preparation requirements and treatments also vary based on crop type and time of year, as follows:

- Soybean fields and forage crop fields (e.g., alfalfa, corn silage) typically provide low crop residue soil surfaces suitable for seeding.
  - Soybean fields are typically harvested beginning in late-September. Harvested soybean fields may be seeded immediately after harvest, preferably before October 1. No-till drill seeded into soybean stubble is preferred. Seed may also be broadcast seeded if prepped by shallow-tillage and followed by a packer.
  - Forage crop fields, such as alfalfa-hay, are harvested throughout the year. Forage crop fields often require some level of site preparation prior to seeding, such as removal of excess residue (e.g., haying) and/or herbicide to suppress existing vegetation and potential weeds. Following herbicide treatment, and based on herbicide manufacturer's recommendations, seed can be directly no-till drilled into forage crop stubble. Seed may also be broadcast seeded but requires shallow tillage prior to broadcast seeding and followed by a packer.
  - Corn harvested for silage provides marginal conditions for seeding. Excessive crop residue following harvest makes no-till drilling seed into corn silage stubble difficult. The residue can plug the seeder double disc-openers. Broadcast seeding requires shallow disking and packing prior to seeding and for best results, packing after seeding. Even in the best-case seeding scenario, crop residue may prevent adequate germination.
- Cornfields, grown for grain, create excessive crop residues and severely compacted soils that can impede seed installation and vegetation establishment. Adequate seedbed preparation for grain corn fields includes baling stocks to remove plant residue, and shallow tillage, possibly followed by packing prior to seeding, and packing following seeding. As grain corn is the last regional crop to be harvested, usually in November, it is often too late for seed germination, including cover-crops prior to winter.

**Table 6** provides guidance for a planned schedule and sequence of site preparation activities under different construction start scenarios. This table along with consultation from a qualified vegetation management professional will be used to develop the appropriate prescription based on the final project schedule. **Table 10** and Section 6.3 provide additional information about preferred annual seeding time periods for temporary and perennial seeding, respectively.

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Table 6. 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	<u>Perennial seed mix in optimal seeding window</u> – Areas that will not be graded.  (April 1 – June 30)  <u>Temporary seed mix</u> (spring/fall seed mix) – Areas to be graded.  (April 1 – June 1)	Summer
Summer	Terminate row-crop – Mow, disk or herbicide application	<u>Perennial seed mix in optimal seeding window</u> – Areas that will not be graded.  (June 30 – August 1 Not recommended – Assess current seasonal weather trends; Monitor and prepare for supplemental seeding)  <u>Temporary seed mix</u> (summer seed mix) – Areas to be graded.  (May 1 – August 15)	Fall
Fall	Harvest row-crop	<u>Perennial seed mix in optimal seeding window</u> – 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)  <u>Temporary seed mix</u> (spring/fall seed mix) – Areas to be graded.  (August 1 – September 15)	Winter or spring
Winter	Previous row crop - None	<u>Perennial seed mix in optimal seeding window</u> – Areas that will not be graded.  (February 15 – April 7 – Frost Seeding; Complete when snow depth is 1 ft or less)  <u>Temporary seed mix</u> (winter mix) – Areas to be graded.  (September 1 – November 15)	Spring

In summary, pre-existing vegetation plays a significant role in the potential to establish a desirable vegetation compatible with the Project objectives. Stantec highly recommends working with cooperating agriculture producers and construction contractors prior to construction to ensure desirable crops precede Project construction.

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### 4.2 Soil Handling

Grading may be required to provide flat surfaces for the installation of arrays (**Appendix A**). Grading contractors will be responsible for segregating and stockpiling topsoil and 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 F**) 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, 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 F**) 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 the end 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 7** provides potential seedbed preparation activities based on the timing and conditions of the vegetation management units post-construction.

**Table 7. 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)	<ul style="list-style-type: none"><li>• Cultipacking to firm seed bed, depending on seed installation technique and equipment.</li></ul>

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Pre-Seeding Seedbed Conditions	Potential Seedbed Activities
Harvested row-crop field	<ul style="list-style-type: none"> <li>• Soybeans – None.</li> <li>• Corn – Mowing stalks to mulch corn stover or raking and baling to remove corn stover.</li> </ul>
De-compacted, no existing vegetation (Areas where grading occurred)	<ul style="list-style-type: none"> <li>• Disk to provide uniform surface when post-grading surface would impact seed installation or growth.</li> <li>• Cultipacking to firm seed bed, depending on seed installation technique and equipment.</li> </ul>
Not compacted, temporary seed mix present, no large areas of annual or perennial weeds	<ul style="list-style-type: none"> <li>• Spotspray areas of annual or perennial weeds to reduce competition and prevent weed establishment.</li> <li>• 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.</li> </ul>
Not compacted, sparse to no temporary seed mix present, extensive areas of annual or perennial weeds	<ul style="list-style-type: none"> <li>• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to reduce weed competition.</li> </ul>
Existing vegetation is temporary cover crop that includes species such as winter wheat.	<ul style="list-style-type: none"> <li>• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to terminate crop either prior to or immediately after seeding.</li> </ul>
Existing vegetation is pasture/hayland, but <b>NOT</b> native sod	<ul style="list-style-type: none"> <li>• Broadcast spray with a non-selective, non-residual herbicide such as glyphosate to reduce vegetation competition.</li> </ul>
Wet areas with existing invasive vegetation or bare ground.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
Existing vegetation is NATIVE sod	<ul style="list-style-type: none"> <li>• Do not impact the sod and consult a qualified vegetation management professional.</li> </ul>

### 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



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noxious weeds (**Table 8**) 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 8. MDA-listed Noxious Weeds**

MDA-listed Noxious Weed Species			
<b>Eradicate</b> – 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	Poison hemlock
Common teasel	Giant hogweed	Meadow knapweed	Tree of heaven
Cutleaf teasel	Grecian foxglove	Oriental bittersweet	Yellow starthistle
<b>Control</b> – 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	Non-native phragmites	Wild parsnip
Canada thistle	Japanese knotweed	Plumeless thistle	
Common barberry	Leafy spurge	Purple loosestrife	
Common tansy	Narrowleaf bittercress	Spotted knapweed	
<b>Restricted</b> – 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.  <i>*(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.)</i>			

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MDA-listed Noxious Weed Species			
Amur honeysuckle	Crown vetch	Japanese barberry cultivars	Siberian peashrub
Bell's honeysuckle	European alder	Morrow's honeysuckle	Tatarian honeysuckle
Black locust	Garlic mustard	Multiflora rose	Wild carrot/Queen Anne's lace
Common or European buckthorn	Glossy buckthorn	Porcelain berry	

Invasive plant species are primarily non-native, but sometimes native plant species that can be aggressive and outcompete other plant species. **Table 9** 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 9. Non-native Terrestrial Plants Considered to be Potentially Invasive in Natural Areas**

Flowering plants			
Birdsfoot trefoil	Cow vetch and hairy vetch	Hoary alyssum	Poison hemlock
Bull thistle	Creeping Charlie	Leafy spurge*	Queen Anne's lace*
Butter and eggs	Crown vetch or axseed*	Musk or nodding thistle	Spotted knapweed*
Canada thistle*	Erect hedgeparsley	Orange hawkweed	White and yellow sweet clover
Common tansy*	Garlic mustard*	Oxeye daisy	Wild parsnip*
Grasses			
Amur silver grass	Reed canary grass	Smooth brome grass	
Trees and shrubs			
Amur cork tree	Buckthorn*	Non-native knotweeds	Siberian pea shrub
Amur maple*	Japanese barberry*	Norway maple*	Winged burning bush*
Autumn olive	Multiflora rose*	Russian olive	
Black locust	Non-native bush honeysuckles*	Siberian elm	

\*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.

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- 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 Seeding Phases and Cover Crops

Seeding of the Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist- Mesic Soils, and Pollinator Mix is anticipated to be completed in phases, as follows.

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### 4.7.1 Pre-construction

The preference is to install and establish this seed mix prior to construction. The advantages of seeding prior to construction include:

- 100 percent coverage by seeding equipment for 100 percent vegetation coverage whereas seeding post-construction prohibits drill-seeding under panels leaving a significant portion of the site inadequately seeded.
- Significantly less time consuming, therefore less expensive.
- Eliminates the potential of damage to solar infrastructure by seeding equipment.
- Additional time for establishment of the root system which facilitates better drainage that lessens mud and rutting; and
- Established turf holds down dust that is hard on construction equipment.

In summary, seeding prior to construction can facilitate more extensive vegetation cover, requires less technical operation of seeding equipment, is less expensive, minimizes damage to solar infrastructure, and improves construction conditions by making it less muddy and dusty.

There are three potential pre-construction seed installation windows, dependent on the status of the fields prior to construction:

1. If the Project Area is not cropped, then the preferred seeding window is early to mid-spring, mid-April through May to allow the seed mix to establish for a full growing season prior to start of construction.
2. If the Project Area is cropped, then seeding will occur in fall immediately following crop harvest and seedbed preparation. Soybean is recommended as the final crop to minimize seedbed preparation requirements and to allow for an early harvest to accommodate seed installation. If seeding is done immediately after crop harvest, depending on site and weather conditions, and seed installation timing, seed may germinate and grow prior to the first killing freeze, then overwinter.
3. If seed is not installed immediately after soybean harvest, then dormant seeding will be done. Seedbed preparation should occur when there is no snow cover and soils are not frozen. Seed should be installed after November 1 so it can overwinter and germinate in the spring. Dormant seeding rates should be increased by at least 20 percent.

A temporary cover crop should be installed with native seed following **Tables B.1-A – Table B.1-D (Appendix B)** to provide cover and assist with grow-in of permanent seed, as follows:

- If permanent seed is installed during the spring, the cover crop should consist of oats, at the recommended rates provided in **Table B.1-D Appendix B**.
- If permanent seed is installed during fall through winter, the cover crop should consist of winter wheat and or annual ryegrass as described in **Table B.1-B Appendix B**. Dormant seeding rates for the permanent seed should be increased by 20 percent.

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The site should then be assessed in spring and any bare or thin spots remediated through additional seeding of the Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils, or Pollinator Mix and a temporary cover crop as outlined in **Appendix B, Tables B.1-A – Table B.1-D**.

### 4.7.2 Construction through Post-Construction

Construction activity (e.g., pile driving, access road construction, and routine traffic) in areas where the seed mix is established is expected to result in minor to moderate disturbance. Disturbed areas should be prepped and re-seeded using the Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils or Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils and a temporary cover crop for compliance with the SWPPP. If repair seeding occurs in the spring through early summer, the cover crop should consist of oats. The cover crop should be installed at a lower rate when combined with permanent seed.

Temporary seeding may also be used to temporarily stabilize soils disturbed by Project construction prior to permanent seed installation. Species selection should be based on timing and seeding rates following **Tables B.1-A – Table B.1-D (Appendix B)**. The cover crop should be installed at a higher rate when seeded alone.

For areas that are more impacted (e.g., routine traffic lanes, staging and laydown yards, etc.), soil compaction may limit vegetation establishment. If accessible, these areas should be deep tilled with an off-set disc, chisel plow or soil-ripper to fracture compacted soils. Following deep tillage, soils should be harrowed to create a smooth, firm, and friable seedbed, and then packed. Soil fracturing and harrowing is not possible in inaccessible areas (e.g., under PV panels). Seeding rates should be increased by at least 20% when re-seeding areas that are not fully prepped because they are inaccessible.

# 5 Seeding Methods

Seed installation methods are dependent upon existing conditions and installation timing. The three common seeding methods are: 1) drill seeding, 2) broadcast seeding, and 3) culti-packer seeding (e.g., Brillion seeder). **Appendix D** highlights comparisons between the three types of seeding.

## 5.1 Drill Seeding

Drilling is the preferred method for seed installation for preconstruction seeding, especially where crop residues are present. Drill seeding typically requires less soil preparation and less seed. However, drill seeding is difficult or impracticable in tight spaces (e.g., near panels) and is not viable for placing seed under PV panels. A native seed drill (e.g., Truax or Great Plains) is recommended to install native grasses and forbs. The tractor-drill operator needs to check and confirm seed placement is not deeper than ½ inch and preferably less than ¼ inch deep into the soils. It is critical that the tractor-drill operator understands how to adjust drill depth for proper seed burial depth.

## 5.2 Broadcast Seeding

Broadcast seeding requires soil preparation to create a friable bare soil surface. If soils are too fluffy, grass seed may sink below the 1-inch threshold for adequate germination and establishment. If the soils are deemed too fluffy for successful installation, then the soils should be packed before seeding. In almost every case, broadcasted seed should be packed following seeding to enhance seed-soil contact.

Broadcast seeding, although not preferable, provides the only method to install post-construction temporary and permanent seed mixes under PV panels. If this becomes the default seeding method, it is recommended to increase seeding rates by 20 percent. For broadcast seeding post construction, the following sequence is recommended:

1. Site preparation, including soil ripping or deep discing,
2. Firming with a drag harrow or packer,
3. Broadcast seed installation, and then
4. Finishing with an additional packing or light drag-harrowing.

Mechanical broadcasters are acceptable for sowing native seed mixes if the device manufacturer specifies use for evenly concurrently spreading seeds that are very small as well as bearded native grass seeds (those with attached appendages such as awns, pappus, hulls, etc.). Broadcasting of native seed may be done in the winter in areas of mostly bare soils without packing as seeds are likely to be incorporated into soils via natural freeze-thaw cycles.

Inert fillers, such as fine wood shavings, rice hulls, or cracked wheat may be used to assist with mixing and calibration in spreader hoppers.

Cultipacker seeding is the preferred seeding method for soils with low crop residue and finely textured soils. Cultipacker seeders are a good choice in pre-construction scenarios, for array and perimeter seed mixes blends in soybean stubble, or bare soils with little crop residue and finely tilled soils.

## 5.3 Seeding Depth

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Caution is recommended to minimize burying seeds too deep, either during broadcasting and subsequent packing / raking or during drilling. Loose soils, such as in areas that are shallow disced prior to seeding, are prone to deep seed burial. The recommended planting depth is between 1/16 - 1/4 inches deep, especially for small seeds that comprise much of the permanent mixes. Large seed, such as cover crop seed can be seeded slightly deeper, no more than 1/2 inch deep. It is recommended to minimize vehicle and equipment traffic on recently seeded areas to minimize additional compaction and seed burial.

### 5.4 Mulching

Mulch may need to be applied following permanent seeding to assist with seed germination. Local sources of clean, seed-free hay or straw mulch is acceptable. Certified weed-free hay or straw is preferred. Hydromulch is a suitable substitute for hay or straw mulch. Hydromulching has the potential to incorporate seed with the mulch; therefore, seed and mulch are applied in the same procedure. Hydromulching is expensive, but sometimes necessary for seeding and stabilizing soils in areas difficult to establish with traditional seeding tactics. This often includes slopes around storm water run-off ponds and other areas prone to extensive washing following rainstorms. Mulching and other forms of erosion control should be done following the SWPPP, including provisions for materials, anchoring, and product selection.

A two-step process is recommended for hydroseeding native seed:

1. Broadcast seed at the recommended rate (increase seeding rate by 20% for broadcast seeding), then
2. Apply hydromulch material following manufacturer instructions.

# 6 SEED MIXES

## 6.1 Array and Vegetated Buffer Planting

One of the objectives for seeding within the array and buffer areas is to install a regionally appropriate grass-dominated seed mix that is influenced by the guidelines outlined in the MNDNR *Prairie Establishment and Maintenance Technical Guidance for Solar Projects* (MNDNR, 2020). To accomplish this, Iron Pine Solar is proposing to establish low-growing, regionally appropriate grass-dominated seed mixes with the following characteristics, which were informed by the 2020 MNDNR guide:

- A minimum seeding rate of 40 seeds/sq. ft.<sup>2</sup>
- At least 30% of the total seeding rate should be composed of perennial forbs.
- 5 or more native grass/sedge species with at least 2 species of bunchgrass.
- 10-15 or more native forbs with at least 2 species in each bloom period: Early (April-May), Mid (June-August), and Late (August-October).

Temporary and permanent seed mixes are custom designed to establish vegetation suitable to existing soil characteristics, shade created by solar facility equipment, and in strict adherence to height restrictions to prevent vegetation from competing with PV panels for sunlight. The seeding plan for this Project includes installation of permanent seed paired with quickly establishing temporary cover crop species.

Proposed seed mix tables including species name, seeding rate, and seeds/square foot are provided in **Appendix B**. As part of agency consultation in developing this VMP, Iron Pine Solar met with the Minnesota Department of Commerce (DOC) Vegetation Management Plan Working Group (VMPWG) on May 16, 2023. The VMPWG is comprised of representatives of the Minnesota Department of Commerce Energy Environmental Review and Analysis Staff, the MNDNR, the MDA, and the MN BWSR. The seed mixes provided in this VMP were developed in coordination with the DOC VMPWG and based on MN BWSR's Low Growing Solar Array Mix – Southwest seed mix and Low Growing Solar Array Moist Soils-South and various other regionally available regionally-appropriate seed mixes. **Figure 10** generally delineates where the seed mixes should be used throughout the proposed re-vegetation areas based on the current facility design.

As part of the Adaptive Management program (see Section 8.3), 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 on a combination of the following:

- Maintaining a minimum seeding rate that has shown to be effective in establishing vegetative cover on recently disturbed surfaces.
- Maintaining species functional group composition when substitutions are required.
- Referencing recognized sources of information for acceptable substitutions and seed mix design such as MNDNR and MN BWSR.
- Integrating lessons learned about vegetation management from others within solar energy industry.



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Two factors that are important to a successful seeding is the timing of the seeding and the equipment used. Based on the Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils, and Pollinator Mix proposed for the Project, MN BWSR recommends the following dates:

- February 15 to April 7, when broadcast frost seeding
- April 1 to June 30, after soil temperature is above 60° F
- After November 1, in particular when soil temperatures are below 60° F

Temporary seed mixes are likely to be used in areas not stabilized with permanent perennial vegetation during the pre-construction or construction phases until a regionally appropriate seeding window is available.

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.

MN BWSR and Minnesota Department of Transportation (MNDOT) maintain and annually update an approved seed substitution list for many regionally appropriate species based on querying approved seed vendors. If one or more species are not available or are available at limited quantities, these lists should be referenced to select appropriate substitutions. Using the MN BWSR and MNDOT substitution lists helps to ensure that plant species substitutions are made within the same functional groups. Nurseries specializing in native plants can also provide recommendations for substitutions. Proposed substitutions will need to be approved by Iron Pine Solar staff prior to installation.

### 6.2 Stormwater Detention Area Planting

In areas designated a permanent stormwater detention area within the Project Area, MN BWSR's Stormwater South and West will be used (**Appendix B, Table B.5**). 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 regionally appropriate plant community.

### 6.3 Temporary Seed Mixes / Cover Crops

Temporary seeding of cover crops may also be planted to stabilize soils if agricultural fields are left idle or overwintered prior to permanent seeding or to temporarily stabilized soils that are disturbed during Project construction (e.g., graded soils, stockpiled soils, etc.), per the Project's SWPPP (**Appendix E**).

Temporary seed mixes / cover crops are designed to meet two primary objectives:

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- Compliance with the Project's SWPPP; and
- Assist with establishment of permanent vegetation.

Cover crops are composed of annual grasses that establish quickly, provide erosion control, build soil organic matter, reduce soil compaction, and assist with weed suppression. Three annual grasses – winter wheat (*Triticum aestivum*), annual ryegrass (*Lolium multiflorum*) and seed oats (*Avena sativa*) will be utilized, depending on installation timing.

Seeding rates for temporary species are selected based installation timing, seeding methods, and whether cover crops are installed with or without permanent seed. Seed mix specifications for temporary cover crops are provided in **Appendix B, Tables B.1-A – B.1-D**. Temporary cover crop seeding rates are higher when seeded without permanent seed and when installed during the dormant season. Final cover crop seed selection should occur when seeding dates are known. Annual cover crops are terminated with regular ongoing management mowing or with killing frosts.

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

**Table 20. 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
Summer Season	May 1 – August 15
Winter Season	September 1 – November 15
*Determine appropriate mix based on seasonal trends and conditions.	

To reduce competition from temporary cover crops to perennial vegetation germination, cover crops should be terminated with a non-selective, non-residual herbicide such as glyphosate prior to seed installation or immediately after installation.

### 6.4 Pesticide Drift

The Project Area is located within a rural landscape but borders few additional agricultural areas. Though limited to a small stretch in the northeast corner and the interior boundary of the central block, there is the potential for landowner use of pesticides outside of vegetation management units. Impacts due to pesticide drift to the vegetation within the arrays are reduced using the following practices:

- Establish and maintain a buffer composed of regionally appropriate low growing grass-dominated buffers along the outside perimeter of the fence lines.

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- Adjacent landowners will be annually notified of the importance of avoiding pesticide drift. Impacts due to pesticide drift will be recorded during seasonal inspections and annual monitoring. Landowners will be notified that repeated impacts to Project vegetation due to pesticide drift will result in the landowner paying for re-seeding and establishment costs.

### 6.5 Seed Mix Vendors

Seed will be purchased from local vendors that supply quality local sourced seed, or at a minimum, seed that has proven successful under the Project site environmental parameters. All seed, including temporary cover crop and permanent seed mixes, should be supplied with seed tags that indicate seed weight, pure live seed, region of origin, and noxious weed content. A list of potential seed vendors is provided in **Appendix C**.

# 7 Vegetation Maintenance

Properly timed mowing and spot herbicide treatments can reduce overall maintenance requirements during the Project life cycle. Maintenance can be divided into two phases: the establishment maintenance phase and the long-term maintenance phase. Establishment maintenance, consisting of mowing and herbicide treatments for noxious and invasive weeds, is critical to successful vegetation establishment during the first three years. Long-term maintenance, consisting of mowing and spot herbicide treatment, allows desirable vegetation to persist over the life of the Project.

Monitoring establishing vegetation during this period should facilitate proper timing and treatment activities to ensure early problems do not become larger issues.

Despite the clean appearance of recently harvested agricultural fields, incompatible weeds often persist and thrive. Noxious and weed species management should be conducted as needed to:

- Minimize the spread of noxious weeds from existing populations, if present,
- Prepare seeding areas for permanent vegetation to reduce competition and improve establishment and success of the permanent seed mixes (as needed), and
- Reduce vegetation impacts on PV panels and other solar facility infrastructure.

Noxious and weed species management may consist of cutting / mowing and herbicide treatments.

## 7.1 Cutting / Mowing

Vegetation cutting should be appropriately timed to assist with control of noxious and weedy species (e.g., mow biennial species during the flower-bud stage, and prior to seed production) and to remove vegetation to assist with site seedbed preparation. Methods should be selected based on the aerial extent of vegetation and site accessibility.

Cutting, by mowing or hand-trimming, is the primary management tool used to aid in the establishment of desirable vegetation. Cutting can reduce height, reduce flowering of undesirable vegetation, and maintain sunlight at the ground surface to encourage germination and growth of desirable species. Mowing using a deck mower is applicable in areas that are accessible with a small tractor and mower. Flail mowers are preferred but rotary mowers are acceptable if significant clumping of grass clippings is minimized. A 3-point side-mounted trimmer mower attached to a small tractor may also be used to cut vegetation around steel piles and under panels.

## 7.2 Frequency and Timing

The frequency and timing of cutting and mowing is dependent on the growth phase of the vegetation, with different practices required for the establishment, transition, and long-term maintenance phases. Specifications for each phase are provided below.

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### **7.3 Pre-Construction and Construction Phase Practices (Prior to Year 0)**

Construction may take one or more years to 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 Array Low Grow Grass and Wildflower Seed Mix for Dry-Mesic Soils, Array Low Grow Grass and Wildflower Seed Mix for Moist-Mesic Soils, and Pollinator 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 7.4. 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 conditions in areas that require grading prior to installing facility infrastructure. 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 within a management unit block 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).

### **7.4 Short-Term Establishment Practices (Years 0 – 5)**

The period between regionally appropriate seed and plant installation (Year 0) through the fourth or fifth growing season (Year 5) is typically defined as the establishment period. The key priorities for establishment during this time period include:

- Reducing competition from annual weeds that shade out or smother regionally appropriate plant seedlings.
- Preventing the establishment of perennial invasive or noxious species.
- 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 2 and 3, there is a marked increase in above ground vegetation density and abundance increases to the point that it can shade out annual plant species and more easily compete with invasive species.

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### Mowing

Mowing during the establishment period is typically the most common and cost-effective strategy for controlling weed species. **Table 11** provides mowing guidelines for both timing and maintaining vegetation heights. It is important to adjust the timing of mowing based on an individual year. Spring and summer weather conditions determine when mowing should occur. Mowing too frequently or too low of a height can negatively impact regionally appropriate vegetation and make establishment more difficult. However, mowing after annual and perennial weed species have set seed is counterproductive for long-term vegetation management. The finished mowing height for each mowing event during the establishment period should be determined prior to mowing and should consider the life cycle and percent cover of weedy species present. In other words, finished mowing height should be driven by current vegetation performance. Feedback from seasonal inspections and annual monitoring will help to determine finished mowing heights during the establishment period.

A qualified vegetation contractor will have the experience and the equipment to correctly mow regionally appropriate plantings. Using a mower that does not windrow thatch that can smother regionally appropriate 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.

During the short-term establishment period, areas under the arrays will be mowed once annually at a minimum. Mowing frequency after the second growing season for areas outside of the arrays will be based on vegetation conditions and quality. Either seed mix areas may be mowed when the vegetation is at the appropriate height and mowed down to the appropriate level. In stormwater detention areas, hand trimming or low ground pressure equipment may be used to prevent rutting and ground disturbance.

Specialized mowing equipment may be used around and under arrays. Additionally, hand work using brush cutters and strip trimmers may be necessary to access difficult areas around arrays and in wet areas where equipment would cause vegetation disturbance.

During the establishment phase, mowing typically occurs throughout the entire site. Within a vegetation management unit, 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 be 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 during the growing season to inform appropriate mowing and herbicide management. Frequent mowing required to manage weedy plant species in particular areas during and after the third growing will be a potential trigger to determine if supplemental seeding is required due to a lack of regionally appropriate vegetation establishment.

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**Table 11. Mowing Conditions and Specifications During the Short-Term Establishment Period**

Initial Mowing	Mowing Height	Mowing Period	Mowing Triggers
Late spring/early summer when vegetation reaches a height of 12 – 18 inches	<p>Finished height of 4 – 6 inches during first growing season.</p> <p>Continue mowing to finished height of 4 – 6 inches in Years 1 – 4, as necessary based on weed pressure.</p> <p>Finished height of 8 – 12 inches during Year 5, if not sooner based on weed pressure.</p>	May – November, typically two events per growing season	<p>Flowering annual weeds</p> <p>Dense annual vegetation with a height of 12 – 18 inches.</p>

### 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 regionally appropriate 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 13** 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 13** 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 13** are classified as neonicotinoids, a class of insecticide that is believed to have a negative impact on pollinating insects.

Since the majority of the vegetation management units will be seeded to a regionally appropriate grass-dominated seed mix, the use of broadleaf-specific herbicides will be effective against many noxious and invasive plant species while minimizing the opportunity to off-target damage to regionally appropriate 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 regionally appropriate grass 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.

### Supplemental Seeding

When perennial vegetation establishment has not reach at least 70 percent coverage, supplemental

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seeding will be required. Vegetation monitoring detailed in Section 8 will determine if and/or where supplemental seeding is required. The necessity for supplemental seeding does not indicate that the initial seeding was a failure. Supplemental seeding will occur during the same seeding windows as described in **Table 6**.

Potential areas that are candidates for supplemental seeding include:

- Areas where localized broadcast herbicide application occurred.
- Areas with observed hydrology requiring either wetter or drier species.

During monthly inspections and annual monitoring, areas where supplemental seeding will be required will be mapped and considered during the annual review of the adaptive management program. Repeated supplemental seedings in the same general vicinity may indicate that a change in management techniques, soil amendments, or seed mix may be required.

### 7.5 Long-Term Maintenance Practices (Years 6+)

In Year 6, a well-managed regionally appropriate seeding typically transitions from establishment to maintenance. The transition from the establishment phase to maintenance phase will be marked by having 70 percent or greater perennial vegetation established throughout the site. 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 objective set in the VMP. For the Project Area, this means:

- Desired vegetation succeeding in the appropriate locations throughout the Project Area.
- Meeting or exceeding vegetation standards outlined in the long-term vegetation objectives.
- Using inspections and monitoring to trigger proactive management actions that keeps the facilities vegetation meeting the management objectives.

Year 6 through the end of the permit period is referred to as the maintenance period because regionally appropriate plant species have evolved to persist in the environment through a wide range of conditions. However, maintenance does not infer maintenance-free. Regionally appropriate 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 vegetation management units will likely be the main form of disturbance.

#### 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 12** 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. Mowing that generates thatch that may be detrimental to vegetation growth will be collected as part of the mowing activity or addressed by using equipment that minimizes thatch accumulation.



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Table 12. Guidelines for Mowing During the Maintenance Period

Initial Mowing	Mowing Height	Mowing Period	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	<ul style="list-style-type: none"><li>• Vegetation exceeds 18 inches, which has the potential to shade panels.</li><li>• Presence of woody vegetation seedlings</li><li>• Accumulation of thatch and dead stems that represent a fire hazard.</li><li>• Vegetation that does not look healthy or vigorous.</li><li>• Desired perennial vegetation cover is less than 70% of total vegetation cover.</li><li>• Weedy or annual species compromise greater than 40% of the total vegetation cover.</li></ul>

Mowing one-third of a vegetation management unit every year on a rotational basis and avoiding mowing in the same area in consecutive years provides refugia for pollinator species using the thatch layers for overwintering, nesting, or egg laying 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 a rotation mowing program that results in up to two-thirds of the perennially vegetated areas mowed once every three years to create refugia for pollinators and grassland birds will be evaluated several years into the maintenance period (potentially Year 7 or 8) after observations have been obtained on the typical growth height within the given site conditions. 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.

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

### 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 the regionally appropriate grass vegetation.

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.
- Applying a foliar herbicide to the leaves using a spot spray treatment technique 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.

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### **Herbicide Application**

Similar to the establishment period, herbicide applications during the maintenance period are likely to primarily be spot spraying using low volume backpack sprayers and equipment-mounted hand sprayers. Herbicide selection and timing are similar between establishment and maintenance period. Regular inspections throughout each entire vegetation management unit 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.

### **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.

### **Agricultural Areas included in Project Area and Planned for Future Facility Expansion**

As previously discussed, areas outside of fenced array areas and the designated vegetated buffers will likely remain in agricultural production. Iron Pine Solar will inform landowners of the importance of preventing pesticide drift onto regionally appropriate vegetation, implementing practices that protect soil health, and managing noxious and invasive plant species.

## **7.6 Herbicides**

Herbicide treatments are recommended for management of perennial noxious species, as mowing alone is not typically sufficient for adequate control. Ongoing management of noxious species may be required for compliance with noxious and invasive plant species regulations. Herbicides are also used to remove undesirable vegetation to prepare seeding areas for permanent seed installation.

### **7.6.1 Herbicide Types**

Three general types of herbicides are applicable to the Project: non-selective herbicides, broadleaf-selective herbicides and grass-selective herbicides. Each is detailed below.

#### **7.6.1.1 Non-Selective Herbicides**

Non-selective herbicides injure or kill all types of vegetation, including broadleaves, grasses and grass-like plants, and woody plants. Glyphosate is a non-selective herbicide that is commonly used to remove all vegetation to prepare areas for permanent seeding.

#### **7.6.1.2 Broadleaf-Selective Herbicides**

Broadleaf-selective herbicides are intended to injure or kill only broadleaf plants. There are many types of broadleaf herbicides. Two types commonly used in natural settings include 2,4-D and triclopyr. Both 2,4-D and triclopyr are used to remove broadleaf plants from grass-stands and turf lawns. Some broadleaf herbicides are highly selective, for example, the active ingredient clopyralid is very effective for controlling weedy asters (*Asteraceae*, e.g., Canada Thistle (*Cirsium arvensis*) and legumes (*Fabaceae*, e.g., sweet

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clover (*Melilotus spp.*). Care should be taken to avoid injury to desirable grass species by waiting to apply herbicides after grass seedlings have matured for at least 90 days or have flowered at least once. Also consult the herbicide label for application restrictions following seeding.

### 7.6.1.3 Grass-Selective Herbicides

Grass-selective herbicides are intended to injure or kill only grasses. The most common grass-selective herbicide is clethodim. It is used to selectively target undesirable grasses growing among desirable broadleaf plants.

### 7.6.2 Herbicide Application Methods and Timing

There are two primary methods to apply herbicides: low volume/spot applications and broadcast applications. Methods and timing should be based on a site-specific evaluation of target species, vegetation composition, and sensitivity of adjacent areas to herbicide applications.

#### 7.6.2.1 Low Volume/Spot Applications

This method utilizes a hand-held sprayer mounted to small (3.5 to 25 gallon) tanks to selectively deliver herbicide to individual plants or small clumps of plants. Backpack sprayers are suitable for small areas while pistol sprayers mounted to an all-terrain vehicle or utility terrain vehicle (UTV) are suitable for larger areas or large clumps of vegetation. Wicks may also be used for ultra-low volume delivery of herbicide to undesirable plants growing in sensitive ecological areas. These methods are appropriate for managing discrete populations of weedy and invasive species after construction.

#### 7.6.2.2 Broadcast Applications

This method utilizes a boom or boomless sprayer tanks mounted to a UTV or tractor to broadcast herbicide to large areas. This method is appropriate for large-scale site preparation to remove weedy and invasive vegetation from large areas using a non-selective herbicide.

### 7.6.3 Herbicide Adjuvants

Adjuvants are typically added to herbicide mixes to improve herbicide performance. Adjuvants typically used for natural areas management include hard water treatment additives, surfactants, and penetrants. Herbicide labels should be consulted for recommendations on the types of adjuvants to add to a mix. In general, aquatic-approved adjuvants should be used to minimize potential impacts on wildlife, including pollinators. Aquatic-approved adjuvants should always be used in and near areas of standing water.

### 7.6.4 Herbicide Standard Industry Practices

Herbicides are a valuable vegetation management tool when used according to manufacturer's instructions and following standard industry practices. The following practices are recommended when using herbicides to manage undesirable vegetation:

1. Vegetation managers should apply principles of integrated vegetation management. Herbicides should be used as one of several available 'tools in the toolbox' to manage vegetation and habitats in an ecologically sensitive manner, in addition to mechanical controls (cutting), engineering controls, cultural controls, and in unique circumstances, biological controls.

## VEGETATION MANAGEMENT PLAN

2. Herbicide labels and Safety Data Sheets should be read prior to transport, mixing, loading, and application.
3. The appropriate volume of herbicides and adjuvants necessary to complete a vegetation management task should be utilized. This includes targeted application techniques when practicable and use of properly calibrated equipment to minimize environmental effects.
4. The appropriate concentrations of herbicides and adjuvants as recommended by product labels are used to achieve intended outcomes.
5. Use of selective herbicides to limit effects on non-target plants.
6. Persistent noxious weeds typically require several treatments to adequately control re-growth and spread.
7. Herbicide applications should be conducted during favorable weather conditions to maximize herbicide efficiency and minimize off-site drift and run-off. Avoid herbicide application during persistent heat, drought, freezing or wet conditions.
8. Herbicide should be applied to plants when plants are most physiologically prone to injury by active ingredients. Plants are most prone to herbicide injury when they are actively growing. Plant life cycles targetable for herbicide application include the flower bud-stage and rosette stage. Plants that have senesced following flowering or are inactive due to high heat or drought should not be treated.

### 7.6.5 Herbicide Permitting

Herbicide treatments should be performed by individuals with a current Commercial Pesticide Applicator certification and license issued through the MDA (<https://www.mda.state.mn.us/pesticide-fertilizer/pesticide-applicator-licensing>), and in accordance with all applicable laws, regulations, and herbicide label instructions.

### 7.6.6 Proposed Herbicides

The herbicides that may be used in the Project are listed below in **Table 13**. These herbicides are frequently used in natural area settings to assist with management of species that would be expected to occur in the Project Area. These herbicides have a relatively short half-life and moderate to very unlikely potential to reach shallow groundwater.

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Table 13. Environmental Information for Proposed Herbicides

Active Ingredient	Herbicide Type	Potential Uses	Environmental Fate <sup>1,2</sup>			
			Water Solubility	Soil Half-life	Mineral Soil Sorption Coefficient KOC / FAO Mobility Classification <sup>3</sup>	Groundwater Ubiquity Score (GUS) <sup>4</sup> / Potential to Reach Shallow Groundwater
Glyphosate	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	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	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	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 <sup>5</sup>	6.94 in unknown soil / Likely <sup>5</sup>
Clopyralid	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 <sup>5</sup>	3.96 in silt loam / Likely <sup>5</sup>
Clethodim	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

<sup>1</sup> 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/#>.

<sup>2</sup> Reported for silty/loam or silt loam soils unless otherwise stated in the Herbicide Properties Tool search results.

<sup>3</sup> 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](https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/guidance-reporting-environmental-fate-and-transport#II_C).

<sup>4</sup> Potential to Reach Shallow Groundwater based on discussion in the Herbicide Properties Tool search results.

<sup>5</sup> Appropriate for low volume foliar herbicide applications targeting individual plants or clumps of plants.

# 8 Vegetation Monitoring and Adaptive Management

## 8.1 During Construction

Qualified vegetation management professionals will monitor construction practices that maintain soil health including reducing impacts due to construction such as compaction, soil erosion, soil separation and storage, and stormwater runoff. Construction will be conducted in compliance with the AIMP developed for the Project (**Appendix F**). Qualified vegetation management professionals will also be able to identify, and report weed establishment and proliferation as part of monitoring events, which will be important to avoid weed problems that negatively impact vegetation conditions outlined in the objectives section.

## 8.2 Post-Construction

Post-construction will focus on collecting data that indicates when the NPDES permit may be closed out and on informing establishment management activities. Specifically, the monitoring program will focus on collecting data on percent cover represented by regionally appropriate 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 reseeding, mowing, or spot herbicide applications.

The monitoring program will include two components: multiple inspections and annual monitoring. During the growing season, multiple 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 management units 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 Project team; however, inspection reports will be summarized in the annual monitoring report.

Annual monitoring will consist of a timed meander survey through each vegetation management unit. The meander survey will be modified based on procedures in Bohnen and Galatowitch (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 vegetation management unit, but will follow guidelines in Bohnen and Galatowitch (2016):

- One route for each management unit 5 acres or less.
- Two routes for each management unit between 5 and 59 acres in size.
- One route for every 30 acres in management units between 60 and 300 acres in size.
- Ten or more routes in management units 300 acres in size.

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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 by January 31 of the following year. As part of the adaptive management program, monitoring data and monitoring protocols will be evaluated every 3 to 5 years to determine if the monitoring program needs to be updated. Rationale for updating the protocol could include:

- Changes to reporting requirements for permit compliance.
- Need for different information to effectively inform management decisions.
- New developments in technology or data analysis such as unmanned aerial vehicles, artificial intelligence, and data cloud processing.

### **8.3 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 six years, if a vegetation management unit is not meeting its objectives, developing a work plan for a vegetation management unit 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.
- Incorporating changed management actions into vegetation management unit 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.

### 9 References

Bohnen, J, and S Galatowitsch. "Restoration Evaluation Project Vegetation Monitoring Tool University of Minnesota". [https://www.lccmr.leg.mn/pm\\_info/restoration\\_evaluations/Restoration\\_Evaluation\\_Project\\_Vegetation\\_Monitoring\\_Tool.pdf](https://www.lccmr.leg.mn/pm_info/restoration_evaluations/Restoration_Evaluation_Project_Vegetation_Monitoring_Tool.pdf).

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USDA NRCS. 2016. Minnesota Agronomy Technical Note No. 31 Herbaceous Vegetation Establishment Guide. [https://www.nrcs.usda.gov/wps/PA\\_NRCSCconsumption/download?cid=nrcseprd1294635&ext=pdf](https://www.nrcs.usda.gov/wps/PA_NRCSCconsumption/download?cid=nrcseprd1294635&ext=pdf)



## **VEGETATION MANAGEMENT PLAN**

### **APPENDIX A: CIVIL SITE PLANS**

**(To be inserted based on final engineering design)**

## VEGETATION MANAGEMENT PLAN

### APPENDIX B: SEED MIX TABLES

## VEGETATION MANAGEMENT PLAN

**Table B.1-A – Table B.1-D. Temporary Cover Crop Seed Mixes\***

Table B.1-A Temporary Fall (Late August – Early November) Project site Cover Crop Seed Mix <u>without</u> Permanent Seed*			
Scientific Name	Common Name	Pounds / Acre	Seeds / Sq Ft
<i>Triticum aestivum</i>	Winter Wheat	128.00	44.32
<i>Lolium multiflorum</i>	Annual ryegrass	10.00	52.11

Table B.1-B Temporary Fall (Late August – Early November) Project site Cover Crop Seed Mix <u>with</u> Permanent Seed*			
Scientific Name	Common Name	Pounds / Acre	Seeds / Sq Ft
<i>Triticum aestivum</i>	Winter Wheat	25.00	8.60
<i>Lolium multiflorum</i>	Annual ryegrass	5.00	26.00

Table B.1-C Temporary Spring-Summer (Mid-April – Mid-August) Project site Cover Crop Seed Mix <u>without</u> Permanent Seed*			
Scientific Name	Common Name	Pounds / Acre	Seeds / Sq Ft
<i>Avena sativa</i>	Seed Oats	128.00	44.32
<i>Lolium multiflorum</i>	Annual ryegrass	10.00	52.11

Table B.1-D Spring-Summer and Early Fall (Mid-April – Mid-August) Project site Cover Crop Seed Mix <u>with</u> Permanent Seed*			
Scientific Name	Common Name	Pounds / Acre	Seeds / Sq Ft
<i>Avena sativa</i>	Seed Oats	25.00	8.60
<i>Lolium multiflorum</i>	Annual ryegrass	5.00	26.00

Final cover crop seed selection should occur when tentative seeding dates are known. All seed mixes calculated at Pure Live Seed (PLS). Seeding rates are designed for drilling seed in spring through summer. Broadcasting seed and seeding during the dormant season require at least a 20% increase in PLS rates. Broadcast seed should be packed or harrowed into the soils.

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**Table B.2** Array Low Grow Grass and Wildflower Seed Mix Moist - Mesic Soils<sup>1,2</sup>

Scientific Name <sup>3</sup>	Common Name	Native Status <sup>3,4</sup> N – Native NN – Non-native B – Both native & non-native	Astronomical <sup>5</sup> Bloom Season Sp – Spring Su – Summer Fa – Fall	Ounces /Acre <sup>1</sup>	Seeds/Sq/Ft
<b>GRAMINOIDS (Grasses)</b>					
<i>Calamagrostis canadensis</i>	Blue joint grass	N	Sp – Su	0.1	0.65
<i>Carex scoparia</i>	Pointed Broom Sedge	N	Sp - Su	0.75	1.45
<i>Carex stipata</i>	Awl-fruited Sedge	N	Sp - Su	0.35	0.27
<i>Carex vulpinoidea</i>	Fox Sedge	N	Sp - Su	1.0	1.8
<i>Glyceria striata</i>	Fowl Manna Grass	N	Sp - Su	0.75	1.55
<i>Leersia oryzoides</i>	Rice Cut Grass	N	Su	4	3.1
<i>Muhlenbergia mexicana</i>	Leafy Satin Grass	N	Su	0.25	1.0
<i>Muhlenbergia racemosa</i>	Wild Timothy	N	Su	1.25	3.0
<i>Pascopyrum smithii</i>	Western Wheat Grass	N	Su	16.0	5.50
<i>Poa palustris</i>	Fowl Meadow Bluegrass	N	Sp	16.0	47.00
<b>Array Grass Subtotals</b>		<b>10Spp.</b>		<b>40.45</b>	<b>65.32</b>
<b>FORBS (Wildflowers)</b>					
<i>Achillea millefolium</i>	Yarrow	B	Sp-Fa	0.2	0.82
<i>Allium cernuum</i>	Nodding Onion	N	Sp	0.25	0.04
<i>Anemone canadensis</i>	Canada Anemone	N	Sp	0.0625	0.01
<i>Astragalus canadensis</i>	Milkvetch	N	Sp - Su	3.0	1.2
<i>Blephilia hirsuta</i>	Hairy Wood Mint	N	Su-Fa	0.05	0.28
<i>Chamaecrista fasciculata</i>	Partridge Pea	N	Su	2.0	0.12
<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	N	Su - Fa	0.1	0.8
<i>Gallium boreale</i>	Northern Bedstraw		Sp - Su	0.01	0.02
<i>Gentiana andrewsii</i>	Bottle Gentian	N	Fa	0.025	0.16
<i>Gentiana flavida</i>	Cream Gentian	N	Fa	0.025	0.11
<i>Lobelia siphilitica</i>	Blue Lobelia	N	Su – Fa	0.2	2.3
<i>Lycopus americanus</i>	Water horehound	N	Su – Fa	0.0725	0.22
<i>Lythrum alatum</i>	Winged Loosestrife	N	Sp - Fa	0.035	2.41
<i>Mimulus ringens</i>	Monkey Flower	N	Sp-Fa	0.075	3.96
<i>Pycnanthemum virginianum</i>	Virginia Mountain Mint	N	Sp-Fa	0.2	0.29
<i>Ratibida columnifera</i>	Long Yellow Coneflower	N	Su	0.5	0.5

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Scientific Name <sup>3</sup>	Common Name	Native Status <sup>3,4</sup> N – Native NN – Non-native B – Both native & non-native	Astronomical <sup>5</sup> Bloom Season Sp – Spring Su – Summer Fa – Fall	Ounces /Acre <sup>1</sup>	Seeds/Sq/Ft
<i>Rudbeckia hirta</i>	Black-eyed Susan	N	Su	0.75	1.58
<i>Solidago riddellii</i>	Riddell's Goldenrod	N	Su	0.3	0.64
<i>Sisyrinchium montanum</i>	Stout Blue-eyed Grass	N	Sp	0.25	0.27
<i>Symphyotrichum ericoides</i>	Heath Aster	N	Fa	0.025	0.11
<i>Symphyotrichum laeve</i>	Smooth Aster	N	Su - Fa	0.2	0.25
<i>Tradescantia ohiensis</i>	Ohio Spiderwort	N	Sp – Su	0.1	0.018
<i>Zizia aurea</i>	Golden Alexander	N	Sp	1.25	0.32
<b>Array Flower Subtotals</b>		<b>22 Spp.</b>		<b>9.68</b>	<b>16.428</b>
<b>Array Mix Totals</b>		<b>32 Spp.</b>		<b>50.13</b>	<b>81.748</b>

<sup>1</sup> Final seed selection should occur when tentative seeding dates are known, and actual species composition and rates should be based on availability at the time of procurement.

<sup>2</sup> Species heights are selected for under 24" tall. This modeling takes into account, species in over achieve height by 50% in high nutrient high moisture conditions that are common in Midwest agriculture fields.

<sup>3</sup> Nomenclature and nativity based on:

- Hitchcock, A. S. (1971). Manual of the grasses of the United States (Vol. 1 - 2). Courier Corporation..
- Gray, A. (2021). *Manual: The Botany, the Northern United States*. BoD–Books on Demand.
- USDA Plant Database <https://plants.usda.gov/home/plantProfile?symbol=POPR>
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<sup>4</sup> “Both” is a nativeness category employed by USDA for circumpolar species found around the Northern Hemisphere, see Hitchcock (1971), Gray (2021), and USDA Plant Database <https://plants.usda.gov/home/plantProfile?symbol=POPR>. The “Both” category helps stabilize complexity associated between species, races, and strains, that were “both” Native and Introduced, have sense hybridized, which is desired, acting as a powerful selective force since the advent of sexual reproduction 500 mya.

<sup>5</sup> Priced based on average cost between several wholesale regional seed suppliers, on 05/30/2023

<sup>6</sup> Astronomical bloom seasons coincide with equinox and solstice events which seem to coincide with biological circadian rhythms.

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**Table B.3** Array Low Grow Grass and Wildflower Seed Mix Dry-Mesic Soils<sup>1,2</sup>

Scientific Name <sup>3</sup>	Common Name	Native Status <sup>3,4</sup> N – Native NN – Non-native B – Both native & non-native	Astronomical <sup>5</sup> Bloom Season Sp – Spring Su – Summer Fa – Fall	Ounces /Acre <sup>1</sup>	Seeds/Sq/Ft
<b>GRAMINOIDS (Grasses)</b>					
<i>Bouteloua curtipedula</i>	Side Oats	N	Su	56.0	7.71
<i>Bouteloua gracilis</i>	Blue Grama	N	Sp	8.0	7.35
<i>Bromus kalmii</i>	Kalm's Brome	N	Sp - Su	3.75	0.64
<i>Carex bicknellii</i>	Copper Oval Sedge	N	Su	0.25	0.1
<i>Carex brevior</i>	Plains Oval Sedge	N	Su	0.5	0.33
<i>Cyperus schweinitzii</i>	Schweitzer's Sedge	N	Su	0.2	0.11
<i>Elymus trachycaulus</i>	Slender Wheat Grass	N	Sp - Su	4.0	0.63
<i>Koeleria cristata</i>	June Grass	N	Sp	1.0	4.6
<i>Pascopyrum smithii</i>	Western Wheat Grass	N	Sp - Su	4.0	0.63
<i>Schizachyrium scoparium</i>	Little Bluestem	N	Fa	24.0	8.26
<i>Sporobolus compositus</i>	Rough Drop Seed	N	Fa	3.0	1.93
<i>Sporobolus heterolepis</i>	Northern Drop Seed	N	Su - Fa	0.5	0.18
<b>Array Grass Subtotals</b>		<b>12 Spp.</b>		<b>105.2</b>	<b>32.47</b>
<b>FORBS (Wildflowers)</b>					
<i>Achillea millefolium</i>	Yarrow	N	Sp - Fa	0.2	0.82
<i>Allium stellatum</i>	Prairie Onion	N	Sp	0.25	0.06
<i>Amorpha canescens</i>	Lead Plant	N	Su	0.25	0.09
<i>Aquilegia canadensis</i>	Columbine	N	Su	0.15	0.13
<i>Asclepias tuberosa</i>	Butterfly Milkweed	N	Su - Fa	0.02	0.02
<i>Asclepias verticillata</i>	Whorled milkweed	N	Su - Fa	0.02	0.05
<i>Chamaecrista fasciculata</i> <sup>3</sup>	Partridge Pea	N	Su	3.0	0.19
<i>Dalea candida</i>	White prairie clover	N	Su	1.0	0.44
<i>Dalea purpurea</i>	Purple prairie clover	N	Su	3.0	1.03
<i>Drymocallis arguta</i>	Prairie Cinquefoil	N	Su	0.2	1.06
<i>Echinacea angustifolia</i>	Narrow Leaf Coneflower	N	Su	0.5	0.09
<i>Gentiana flavida</i>	Cream Gentian	N	Fa	0.1	0.45
<i>Heuchera richardsonii</i>	Alumroot	N	Sp	0.025	0.4
<i>Monarda punctata</i>	Spotted Bee Balm	N	Su	0.25	0.52

## VEGETATION MANAGEMENT PLAN

Scientific Name <sup>3</sup>	Common Name	Native Status <sup>3,4</sup> N – Native NN – Non-native B – Both native & non-native	Astronomical <sup>5</sup> Bloom Season Sp – Spring Su – Summer Fa – Fall	Ounces /Acre <sup>1</sup>	Seeds/Sq/Ft
<i>Penstemon grandiflorus</i>	Showy penstemon	N	Sp	0.65	0.21
<i>Ratibida columnifera</i>	Long Yellow Coneflower	N	Su	1.0	1.0
<i>Rudbeckia hirta</i> <sup>3</sup>	Black-eyed Susan	N	Su	0.75	1.58
<i>Solidago nemoralis</i>	Old Field Goldenrod	N	Fa	0.35	2.41
<i>Symphyotrichum ericoides</i>	Heath Aster	N	Fa	0.025	0.11
<i>Symphyotrichum oolentangiense</i>	Sky Blue	N	Fa	0.15	0.24
<i>Tradescantia bracteata</i>	Long-bracted Spiderwort	N	Sp – Su	0.15	0.03
<i>Verbena stricta</i>	Hoary Vervain	N	Su	0.75	0.48
<i>Zizia aptera</i>	Heart-Leaf Golden Alexander	N	Sp - Su	0.2	0.06
<b>Array Flower Subtotals</b>		<b>22 Spp.</b>		<b>12.99</b>	<b>11.47</b>
<b>Array Mix Totals</b>		<b>34 Spp.</b>		<b>118.19</b>	<b>43.94</b>

<sup>1</sup> Final seed selection should occur when tentative seeding dates are known, and actual species composition and rates should be based on availability at the time of procurement.

<sup>2</sup> Species heights are selected for under 24" tall. This modeling takes into account, species in over achieve height by 50% in high nutrient high moisture conditions that are common in Midwest agriculture fields.

<sup>3</sup> Nomenclature and nativity based on:

- Hitchcock, A. S. (1971). Manual of the grasses of the United States (Vol. 1 - 2). Courier Corporation..
- Gray, A. (2021). *Manual: The Botany, the Northern United States*. BoD–Books on Demand.
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- Kartesz, J.T., The Biota of North America Program (BONAP). 2015. North American Plant Atlas. (<http://bonap.net/napa>). Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). Accessed 2023.

<sup>4</sup> “Both” is a nativeness category employed by USDA for circumpolar species found around the Northern Hemisphere, see Hitchcock (1971), Gray (2021), and USDA Plant Database <https://plants.usda.gov/home/plantProfile?symbol=POPR>. The “Both” category helps stabilize complexity associated between species, races, and strains, that were “both” Native and Introduced, have sense hybridized, which is desired, acting as a powerful selective force since the advent of sexual reproduction 500 mya.

<sup>5</sup> Astronomical bloom seasons coincide with equinox and solstice events which seem to coincide with biological circadian rhythms.

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**Table B.4. Pollinator Perimeter Seed Mix Dry Soils**

Function: Pollinator Planting Area: NE Specialization:

	Scientific Name	Common Name	Seeds /sq ft	Rate (lb/ac)	% Mix (by sqft)	% Mix (by wt)
<b>Cover</b>	<i>Avena sativa</i>	Oats* (See Cover crop note)	11.13	37.88		
Total Guild:			11.13	37.88	12.95%	80.2%
<b>Forb</b>	<i>Agastache foeniculum</i>	Blue Giant Hyssop	2.07	0.06		
	<i>Asclepias tuberosa</i>	Butterfly Milkweed	0.1	0.06		
	<i>Helianthus pauciflorus</i>	Stiff Sunflower	0.09	0.06		
	<i>Monarda fistulosa</i>	Wild Bergamot	1.42	0.06		
	<i>Oligoneuron rigidum</i>	Stiff Goldenrod	0.83	0.06		
	<i>Penstemon grandiflorus</i>	Large-flowered Beard Tongue	1	0.19		
	<i>Rudbeckia hirta</i>	Black-eyed Susan	10.32	0.31		
	<i>Solidago nemoralis</i>	Gray Goldenrod	3.86	0.04		
	<i>Symphyotrichum ericoides</i>	Heath Aster	2.58	0.04		
	<i>Symphyotrichum laeve</i>	Smooth Aster	1.26	0.06		
	<i>Verbena stricta</i>	Hoary Vervain	2	0.19		
	<i>Viola pedatifida</i>	Bearded Birdfoot Violet	0.14	0.01		
Total Guild:			25.67	1.14	29.86%	2.4%
<b>Graminoid</b>	<i>Andropogon gerardii</i>	Big Bluestem	2.57	0.70		
	<i>Bromus kalmii</i>	Kalm's Brome	6	2.04		
	<i>Elymus canadensis</i>	Canada Wild Rye	1.91	1.00		
	<i>Koeleria macrantha</i>	Junegrass	16	0.22		
	<i>Schizachyrium scoparium</i>	Little Bluestem	18	3.25		
	<i>Sorghastrum nutans</i>	Indian Grass	2.8	0.64		
Total Guild:			47.28	7.85	55.00%	16.7%
<b>Legume</b>	<i>Dalea candida</i>	White Prairie Clover	0.39	0.06		
	<i>Dalea purpurea</i>	Purple Prairie Clover	1.5	0.27		
Total Guild:			1.89	0.33	2.20%	0.7%
Total Seed Mix:			85.97	47.20		



## VEGETATION MANAGEMENT PLAN

**Table B.5 Stormwater Basin Seed Mix**

33-361

Common Name	Scientific Name	Rate (kg/ha)	Rate (lb/ac)	% of Mix (% by wt)	Seeds/ sq ft
fringed brome	<i>Bromus ciliatus</i>	4.09	3.65	10.43%	14.75
bluejoint	<i>Calamagrostis canadensis</i>	0.06	0.05	0.13%	4.80
nodding wild rye	<i>Elymus canadensis</i>	2.24	2.00	5.71%	3.82
Virginia wild rye	<i>Elymus virginicus</i>	2.24	2.00	5.73%	3.09
tall manna grass	<i>Glyceria grandis</i>	0.18	0.16	0.44%	4.00
fowl bluegrass	<i>Poa palustris</i>	0.72	0.64	1.82%	30.40
	<b>Total Grasses</b>	<b>9.53</b>	<b>8.50</b>	<b>24.26%</b>	<b>60.86</b>
porcupine sedge	<i>Carex hystericina</i>	0.10	0.09	0.26%	1.00
pointed broom sedge	<i>Carex scoparia</i>	0.04	0.04	0.12%	1.30
dark green bulrush	<i>Scirpus atrovirens</i>	0.30	0.27	0.76%	45.00
woolgrass	<i>Scirpus cyperinus</i>	0.11	0.10	0.27%	60.00
	<b>Total Sedges and Rushes</b>	<b>0.56</b>	<b>0.50</b>	<b>0.27%</b>	<b>107.30</b>
Canada anemone	<i>Anemone canadensis</i>	0.11	0.10	0.29%	0.30
marsh milkweed	<i>Asclepias incarnata</i>	0.50	0.45	1.30%	0.80
flat-topped aster	<i>Doellingeria umbellata</i>	0.11	0.10	0.29%	2.50
common boneset	<i>Eupatorium perfoliatum</i>	0.06	0.05	0.15%	3.00
grass-leaved goldenrod	<i>Euthamia graminifolia</i>	0.04	0.04	0.11%	5.00
spotted Joe pye weed	<i>Eutrochium maculatum</i>	0.17	0.15	0.42%	5.10
blue monkey flower	<i>Mimulus ringens</i>	0.02	0.02	0.07%	20.00
giant goldenrod	<i>Solidago gigantea</i>	0.02	0.02	0.06%	2.00
eastern panicled aster	<i>Symphotrichum lanceolatum</i>	0.02	0.02	0.05%	1.00
tall meadow-rue	<i>Thalictrum dasycarpum</i>	0.06	0.05	0.16%	0.40
	<b>Total Forbs</b>	<b>1.12</b>	<b>1.00</b>	<b>2.90%</b>	<b>40.10</b>
Oats	<i>Avena sativa</i>	28.02	25.00	71.43%	11.14
	<b>Total Cover Crop</b>	<b>28.02</b>	<b>25.00</b>	<b>71.43%</b>	<b>11.14</b>
	<b>Totals:</b>	<b>39.23</b>	<b>35.00</b>	<b>100.00%</b>	<b>219.40</b>
<b>Purpose:</b>	Stormwater pond edges, temporarily flooded dry ponds, and temporarily flooded ditch bottoms.				

**APPENDIX C: POTENTIAL REGIONAL SEED VENDORS**

## VEGETATION MANAGEMENT PLAN

**Table C.1** Potential Regional Seed Vendors

Company	Phone	Website	Specialty
Agassiz Seed	(651) 287-3400	<a href="https://www.agassizseed.com/">https://www.agassizseed.com/</a>	Native and non-native seed mixes
Agrecol Corporation	(608) 226-2544	<a href="http://www.agrecol.com/SeedMixes">http://www.agrecol.com/SeedMixes</a>	Native and non-native seed mixes
Prairie Moon Nursery	(866) 417-8156	<a href="https://www.shootingstarnativeseed.com/">https://www.shootingstarnativeseed.com/</a>	Native seed mixes
Shooting Star Seed Mixes	(608) 497-0655	<a href="https://www.shootingstarnativeseed.com/">https://www.shootingstarnativeseed.com/</a>	Native and non-native Seed mixes

**APPENDIX D: COMPARISON OF SEEDING METHODS**

## VEGETATION MANAGEMENT PLAN

**Table D.1 Comparison Summary Between Drill and Broadcast Seeding Methods**

Circumstance	Drill Seeding	Broadcast Seeding	Culti-packer Seeder
Soil to Seed Contact	High	Low	Medium
Germination Efficiency	High	Low	Medium
Extra Seed Required to Achieve Compatibility	No	≥ 20%	10%
Seedbed Preparation	Low	High	Medium
Soil Finishing (packing or rolling)	Low	High	Low
Efficiency in Tight Spaces	Low	High	Medium
Ability to Seed Under PV Panels	No	High	No
Seed Washing Potential	Low	High	Medium
Harvested Soybean Field	Yes	Yes	Yes
Harvested Corn Field (followed by mowing, baling, and light discing)	Yes	Yes	Yes
Harvested Forage (hay or silage) Field	Yes	Yes Benefits from light discing	Yes
Post-construction Seeding Within Array Field	Not advised	Advised	Advised
Potential for Second Seeding Event	Low	High	Medium
Speed (acres per hour)	Low	High	Medium
Efficiency (achieve goals / time / cost)	Low	Highly Variable	Medium

## **VEGETATION MANAGEMENT PLAN**

### **APPENDIX E: STORMWATER POLLUTION PREVENTION PLAN (SWPPP)**

(To be inserted based on final engineering design)

**APPENDIX F: AGRICULTURAL IMPACT MITIGATION PLAN**

## **Appendix F**

### **Decommissioning Plan**





**Decommissioning Plan  
Iron Pine Solar Project  
Pine County, Minnesota**



Prepared for:

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480 Atlantic Avenue  
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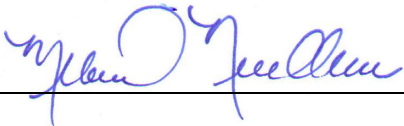
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Project No: 193708962  
February 12, 2024

**DECOMMISSIONING PLAN**  
**IRON PINE SOLAR PROJECT, PINE COUNTY, MINNESOTA**

This document entitled Decommissioning Plan – Iron Pine Solar Project, Pine County, Minnesota, was prepared by Stantec Consulting Services Inc. (“Stantec”) for the use of Iron Pine Solar LLC and Swift Current Energy (the “Client”). The material in this document reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in this document are based on conditions and information existing at the time this document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others.



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## 1.0 INTRODUCTION

Iron Pine Solar LLC (Iron Pine Solar) is proposing to construct and operate the Iron Pine Solar Project (Project) immediately south of the City of Willow River, Pine County, Minnesota. The Project footprint encompasses approximately 1,526 acres within perimeter fencing. The maximum generating capacity of the Project photovoltaic system will be up to 360 megawatts (MW), alternating current (AC) with 325 MW<sub>[AC]</sub> at the point of interconnection (POI).

This Decommissioning Plan (Plan) provides a description of the decommissioning and restoration phase of the Project. Start-of-construction is planned for the third quarter of 2025, with a projected Commercial Operation Date anticipated in first quarter 2027. Major components of the Project include solar modules and associated trackers and steel piles; inverter stations; access roads; perimeter fencing; electrical collection system and substations (Figure 1).

This Plan is applicable to the decommissioning/deconstruction and restoration phases of the Project and has been prepared as a summary of the activities and financial commitments required by the Minnesota Public Utilities Commission (MPUC). Iron Pine Solar is committed to completing the decommissioning of the Project according to the conditions described within the Minnesota Department of Commerce Energy Environmental Review and Analysis (EERA) Application Guidance for Site Permitting of Solar Farms (Guidance).

A summary of the components to be removed is provided in Section 1.1. Summaries of the estimated costs and potential salvage value associated with decommissioning the Project are provided in Section 4.

### 1.1 FACILITY COMPONENTS

The main components of the Project include:

- Solar modules and associated electrical cabling
- Tracking system and steel piles
- Inverter and transformer stations
- Electrical cabling and conduits (above and below ground)
- Perimeter fencing
- Site access and internal roads
- Operations and maintenance structure
- Project substation and overhead transmission generation tie-in line

### 1.2 TRIGGERING EVENTS AND EXPECTED LIFETIME OF PROJECT

Project decommissioning may be triggered by events such as the expiration of lease agreement(s), abandonment, or when the Project reaches the end of its operational life. Abandonment of a solar facility is typically defined as when a facility ceases to transfer energy on a continuous basis for 12 months.

**DECOMMISSIONING PLAN**  
**IRON PINE SOLAR PROJECT, PINE COUNTY, MINNESOTA**

The anticipated lifetime of the Project is approximately 30 years. At the end of the Project's useful life, the modules and associated components will be decommissioned and removed from the Project site. Iron Pine Solar will be the party responsible for decommissioning and restoring the site.

Components of the facility that have resale value may be sold in the wholesale market. Components with no wholesale value will be salvaged and sold as scrap for recycling or disposed of at an approved offsite licensed solid waste disposal facility (landfill). Decommissioning activities will include removal of the solar arrays, and associated components as listed in Section 1.1 and described in Section 2 and restoration activities as described in Section 3.

### **1.3 DECOMMISSIONING SEQUENCE**

Decommissioning activities are anticipated to begin within twelve (12) months of the Project ceasing operation and be completed within 12 months from start of decommissioning. Notice to landowners and applicable units of government will be sent at least 90 days prior to the start of decommissioning. Monitoring and site restoration may extend beyond the 12-month decommissioning period to achieve successful revegetation and rehabilitation. The anticipated sequence of decommissioning and removal is described below; however, overlap of activities is expected.

- Obtain required permits prior to the start of any onsite activities.
- Reinforce access roads, if needed, and prepare site for component removal.
- Install erosion control materials and other best management practices (BMPs) to protect sensitive resources and control erosion during decommissioning activities.
- De-energize solar arrays.
- Dismantle and remove panels and above-ground wiring.
- Remove tracking equipment and piles.
- Remove inverter/transformer stations along with support system and foundation pads.
- Remove above ground electrical cables
- Remove solar array and substation perimeter fence.
- Remove access roads and grade site (as required).
- De-energize and make the substation safe for removal.
- Coordinate with transmission owner to disconnect from grid at the POI.
- Remove substation and associated overhead transmission tie-in line.
- De-compact subsoils as needed, restore, and revegetate disturbed land to allow for pre-construction land use.

## **2.0 PROJECT COMPONENTS AND DECOMMISSIONING ACTIVITIES**

The solar facility components and decommissioning activities necessary to restore the Project area to allow for land use similar to the use prior to Project construction.

## 2.1 OVERVIEW OF FACILITIES

Iron Pine Solar anticipates utilizing approximately 570,622 bifacial solar modules, with a total generating capacity of approximately 395.88 MW direct current (DC) with a maximum of 325 MW<sub>(AC)</sub> at the POI. The Project footprint encompasses approximately 1,526 acres of predominantly agricultural land within perimeter fencing as shown on Figure 1.

All foundations and steel piles will be removed. Electric cabling and conduit installed below the soil surface will be abandoned in place. Access roads and fence may be left in place if requested and/or agreed to by the landowner; however, for purposes of this assessment, all access roads are assumed to be removed. Iron Pine Solar will communicate with the appropriate local agency to coordinate the repair of damaged or modified public roads during the decommissioning and reclamation process, and will coordinate with appropriate federal, state and/or local agencies for necessary permit approvals prior to decommissioning activities.

Estimated quantities of materials to be removed and sold, salvaged, or disposed of are included in this section. Many of the materials described have salvage value, although there are some components that will likely have none at the time of decommissioning. Removed materials that cannot be sold on the resale market will be salvaged or recycled to the extent possible. Other waste materials will be disposed of in accordance with state and federal law in an approved licensed solid waste facility.

Solar panels may have value in a resale market, depending on their condition at the end of the Project life. If the Project is decommissioned prior to the anticipated 30-year timeframe, the component's resale value will be substantially higher than at the end of the projected Project. Table 1 presents a summary of the primary components of the Project included in this decommissioning plan.

**Table 1 Primary Components of Project to be Decommissioned**

Component	Quantity	Unit of Measure
Solar Modules (approximate)	570,622	Each
Tracking System (equivalent full trackers)	7,316	Tracker
Steel Piles	88,776	Each
Inverter Stations with Piers or Foundations	82	Each
Perimeter Fencing	83,805	Linear Foot
Access Roads (approximate)	86,197	Linear Foot
Overhead Tie-in Transmission Line	1.0	Linear Mile
O&M Building (prefabricated)	1	Each
Project Substation	1	Each

## 2.2 SOLAR MODULES

Statistics and estimates provided in this Plan are based on a Canadian Solar 690-watt bifacial module. The module assembly (with frame) will have a total weight of approximately 83.33 pounds and will be

approximately 93.90 inches by 51.30 inches in size. The modules are mainly comprised of non-metallic materials such as silicon, glass, plastic, and epoxies, with an anodized aluminum frame.

At the time of decommissioning, module components in working condition may be refurbished and sold in a secondary market yielding greater revenue than selling as salvage material. The estimates in this report have been calculated using a conservative approach, considering revenue from salvage only, rather than resale of Project components.

## **2.3 TRACKING SYSTEM AND SUPPORT**

The solar modules are planned to be mounted on a single-axis, one-in-portrait tracking system. Each full, three-string tracker will be approximately 318 feet in length and will support 78 modules. Smaller trackers will be employed at the edges of the layout to efficiently utilize available space. The tracking system is mainly comprised of high-strength, galvanized steel and anodized aluminum; steel piles that support the system are assumed to be comprised of galvanized steel.

The solar arrays will be deactivated from the surrounding electrical system and made safe for disassembly. Liquid wastes, including oils and hydraulic fluids will be removed and properly disposed of or recycled according to regulations current at the time of decommissioning. Electronic components, and internal electrical wiring will be removed and salvaged. The steel piles will be completely removed from the ground.

The supports, tracking system, and posts contain salvageable materials which can be sold to provide revenue to offset the decommissioning costs.

## **2.4 INVERTER/TRANSFORMER STATIONS**

The inverter and transformer stations are located within the arrays and will sit on platforms supported by small concrete footings. The inverters and transformers will be deactivated, disassembled, and removed. Depending on the condition of the unit at decommissioning, the equipment may be sold for refurbishment and re-use. If not re-used, they will be salvaged or disposed of at an approved solid waste management facility.

## **2.5 ELECTRICAL CABLING AND CONDUITS**

The Project's underground electrical collection system will be placed at a depth of three feet (36 inches) or greater below the ground surface. This Plan assumes that all underground cabling will be abandoned in place.

## **2.6 PROJECT SUBSTATION**

A Project substation will be constructed as part of the Project development. The substation will contain within its perimeter, a gravel pad, power transformer and footings, an electrical control house, and concrete pads, as needed. The substation transformer may be sold for re-use or salvage. Components of the substation that cannot be salvaged will be transported off-site for disposal at an approved waste management facility. Although the Project substation may remain at the end of the Project life, an estimated decommissioning cost has been included in this Plan.



## 2.7 OVERHEAD GENERATION TIE-IN TRANSMISSION LINE

An overhead electrical generation tie-in transmission line, approximately one mile in length, will be constructed between the Project substation and a proposed utility switchyard (the POI). Removal of the overhead generation tie-in transmission lines is included in this Plan.

## 2.8 OPERATIONS AND MAINTENANCE BUILDING

Iron Pine Solar will include one operations and maintenance (O&M) building as part of the Project. The structure will be a prefabricated building with connections to electrical or other services, as needed. The placement of the structure on the site will be in conformance with local and state building codes and will be removed during the decommissioning process.

## 2.9 PERIMETER FENCING AND ACCESS ROADS

The Project will include a 10-foot-high wildlife-permeable security fence around the perimeter of each solar array site. The total length of fence will be approximately 83,805 feet (15.87 miles).

Access drives from local roads and within the arrays will provide direct access to the solar facility and substation equipment. The access drives will be approximately 12 feet in width and total approximately 86,197 feet (16.3 miles) in length. The access drive lengths may change with final Project design. Landowners may choose to retain the access drives at completion of the Project; however, to be conservative, the decommissioning estimate assumes that all access drives will be removed. Access drives are planned to be gravel.

During installation of the Project, site access drives will be excavated to remove topsoil, the subgrade will be compacted, and aggregate fill will be placed as necessary. This plan is based on a design of twelve inches of gravel with geotextile fabric placed beneath the gravel for the length of each access drive. The estimated quantity of these materials is provided in Table 2.

**Table 2 Typical Access Drive Construction Materials**

Item	Quantity	Unit
Aggregate fill, 12-inch thick – to be removed	38,310	Cubic Yards
Geotextile	114,929	Square Yards

Decommissioning activities include the removal and stockpiling of aggregate materials onsite for salvage preparation. It is conservatively assumed that all aggregate materials will be removed from the Project site and hauled up to five miles from the Project area. Underlying geotextile fabric will also be removed during the decommissioning process. Fabric that is easily separated from the aggregate during excavation will be disposed of in an approved solid waste disposal facility. Fabric that remains with the aggregate will be sorted out at the processing site and properly disposed. Following removal of aggregate and geotextile fabric, the gravel and compacted soil access road areas will be de-compacted with deep ripper or chisel plow (ripped to 18 inches), backfilled with native subsoil and topsoil, as needed, and graded as necessary.

### **3.0 LAND USE AND ENVIRONMENT**

#### **3.1 SOILS AND LAND USE**

The proposed Project is predominantly located on agricultural land. Areas of Project disturbance will be restored to substantially similar conditions that existed immediately prior to Project construction. Soils compacted during de-construction activities will be de-compacted, as necessary.

#### **3.2 RESTORATION AND REVEGETATION**

Areas of the Project that have been excavated and backfilled will be graded as previously described. If present, drain tiles that have been damaged will be restored to pre-construction condition. Restored areas will be revegetated in consultation with the current landowner and in compliance with regulations in place at the time of decommissioning. Work will be completed to comply with the conditions agreed upon by Iron Pine Solar, Project leaseholders, and the MPUC or other federal, state, and local regulations in affect at the time of decommissioning.

If permitted by the landowner who retains control of the land following decommissioning of the Project, Iron Pine Solar will monitor the site for successful revegetation.

#### **3.3 SURFACE WATER DRAINAGE AND CONTROL**

Project facilities are being sited to avoid impacts to wetlands and waterways. The existing Project site conditions and proposed BMPs to protect surface water features will be detailed in a Project Stormwater Pollution Prevention Plan (SWPPP) prior to the commencement of decommissioning construction activities.

Surface water conditions at the Project site will be reassessed prior to the decommissioning phase. Iron Pine Solar will obtain the required water quality permits from the Minnesota Department of Natural Resources (MNDNR) and the U.S. Army Corp of Engineers (USACE), as needed, before decommissioning of the Project. Decommissioning construction stormwater permits will also be obtained and a SWPPP prepared describing the protection needed to reflect conditions present at the time of decommissioning. BMPs may include enhancement of construction entrances, temporary seeding, permanent seeding, mulching (in non-agricultural areas), erosion control matting, silt fence, filter berms, and filter socks.

#### **3.4 MAJOR EQUIPMENT REQUIRED FOR DECOMMISSIONING**

The activities involved in decommissioning the Project include removal of the above- and below-ground components of the Project and restoration as described in Sections 2, 3.1 and 3.2.

Equipment required for the decommissioning activities is similar to what is needed to construct the solar facility and may include, but is not limited to: small cranes, low ground pressure (LGP) tracked excavators, backhoes, LGP tracked bulldozers and dump trucks, front-end loaders, deep rippers, water trucks, disc

plows and tractors to restore subgrade conditions, along with ancillary equipment. Standard dump trucks may be used to transport material removed from the site to disposal facilities.

## **4.0 DECOMMISSIONING COST ESTIMATE SUMMARY**

Expenses associated with decommissioning the Project will be dependent on labor costs at the time of decommissioning. For the purposes of this report, approximate late-2023 market values were used to estimate labor expenses. Fluctuation and inflation of the labor costs or equipment were not factored into the estimates.

The value of the individual components of the Project will vary with time. In general, the highest component value would be expected at the time of construction with declining value over the life of the Project. During the early life of the Project, components such as the solar modules and batteries could be sold in the wholesale market for reuse or refurbishment. Secondary markets for used solar components include other utility scale solar facilities with similar designs that may require replacement equipment due to damage or normal wear over time; or other buyers (e.g., developers, consumers) that are willing to accept a slightly lower power output in return for a significantly lower price point when compared to new equipment. As efficiency and power production of the panels decrease due to aging and/or weathering, the resale value will decline accordingly.

### **4.1 DECOMMISSIONING RISK OVER THE LIFECYCLE OF A PROJECT**

The probability of an event that would lead to abandonment or long-term interruption is extremely low during the first 15 to 20 years of the Project life. Accordingly, the risk of decommissioning the Project is extremely low during this time frame. The reasons why the risk to decommission the Project is extremely low in the early phases of the Project include, but are not limited to, the resale value of the facilities; power purchase agreements in place; manufacturer warranties on components; property damage and business interruption insurance coverage; and the value of renewable energy in general in the current market.

### **4.2 DECOMMISSIONING EXPENSES**

Project decommissioning will incur costs associated with disposal of components not sold for salvage, including materials which will be disposed of at a licensed facility, as required. Decommissioning costs also include backfilling, grading, and restoration of the Project site as described in Sections 2 and 3. Table 3 summarizes the estimates for activities associated with removal of the major components of the Project and site restoration.

**Table 3 Estimated Decommissioning Expenses**

Activity	Unit	Quantity	Cost per Unit	Total
Overhead and management (includes estimated permitting required and public road repairs)	Lump Sum	1	\$1,103,000	\$1,103,000
Solar modules; disassembly and removal	Each	570,622	\$4.95	\$2,824,579
Tracking System disassembly and removal (equivalent full trackers)	Each	7,316	\$685	\$5,011,460
Steel pile/post removal	Each	88,776	\$10.70	\$949,903
Inverter and transformer removal with foundation	Each	82	\$1,860	\$152,520
Access road excavation and removal	Lump Sum	1	\$352,700	\$352,700
Restoration of access roads and rehabilitation of site	Lump Sum	1	\$662,350	\$662,350
Perimeter fence removal (wildlife fence)	Linear Feet	83,805	\$4.60	\$385,503
O&M building (prefabricated)	Lump Sum	1	\$12,000	\$12,000
Project substation	Lump Sum	1	\$400,000	\$400,000
Removed above ground transmission line and poles	Linear Mile	1.00	\$275,000	\$275,000
<b>Total Estimated Decommissioning Cost</b>				<b>\$12,129,015</b>

### 4.3 DECOMMISSIONING REVENUES

Revenue from decommissioning the Project will be realized through the sale of the facility components and construction materials. As previously described, the value of the decommissioned components will be higher in the early stages of the Project and decline over time. Resale of components such as solar panels is expected to be greater than salvage (i.e., scrap) value for at least the first ten years of the Project.

Modules and other solar facility components may be sold within a secondary market or as salvage. A current sampling of used solar panels indicates a wide range of pricing depending on age and condition (\$0.10 to \$0.30 per watt). Future pricing of solar panels is difficult to predict, due to the relatively young age of the market, changes to solar panel technology, and the ever-increasing product demand. A conservative estimation of the value of solar panels at \$0.10 per watt would yield approximately \$39,588,000. To preserve the integrity of the modules, higher removal and handling costs would be expected for module resale versus salvage. However, although costs would be higher, the net revenue due to resale would still be substantially greater than the estimated salvage value.

DECOMMISSIONING PLAN  
IRON PINE SOLAR PROJECT, PINE COUNTY, MINNESOTA

The resale value of components such as trackers, may decline more quickly; however, the salvage value of the steel that makes up a large portion of the tracker is expected to stay at or above the value used in this report.

The market value of steel and other materials fluctuates daily and has varied widely over the past five years. Salvage value estimates were based on an approximate five-year-average price of steel derived from sources including on-line recycling companies and United States Geological Survey (USGS) commodity summaries. The price used to value the steel used in this report is \$262 per metric ton; aluminum at \$0.40 per pound; silicon at \$0.40 per pound and glass at \$0.05 per pound. The main component of the tracking system and piles is assumed to be salvageable steel. Solar panels are estimated to contain approximately 75 percent glass, 8 percent aluminum and 5 percent silicon. A 50 percent recovery rate was assumed for aluminum and all panel components, due to the processing required to separate the panel components. Alternative and more efficient methods of recycling solar panels are anticipated before this Project is decommissioned, given the large number of solar facilities that are currently being developed. Table 4 summarizes the potential salvage value for the solar array components and construction materials.

**Table 4 Estimated Decommissioning Revenues – Solar Facilities**

Item	Unit of Measurement	Quantity per Unit	Salvage Price per Unit	Total Salvage Price per Item	Number of Items	Total
Panels - Silicon	Pounds per Panel	2.1	\$0.40	\$0.840	570,622	\$479,322
Panels - Aluminum	Pounds per Panel	3.3	\$0.40	\$1.320	570,622	\$753,221
Panels - Glass	Pounds per Panel	31.3	\$0.05	\$1.565	570,622	\$893,023
Tracking System and Posts	Metric tons per MW <sub>[DC]</sub>	32.0	\$262	\$8,384	395.88	\$3,319,058
Substation	Each	1	\$50,000	\$50,000	1	\$50,000
<b>Total Estimated Decommissioning Revenue – Solar Facilities</b>						<b>\$5,494,624*</b>

\* Revenue based on salvage value only. Revenue from used panels at \$0.10 per watt could raise \$39,588,000 as resale versus the estimated salvage revenue.

#### 4.4 DECOMMISSIONING COST SUMMARY

Table 5 provides a summary of the estimated cost to decommission the Project, using the information detailed in Section 4.2. Estimates are based on late-2023 prices, with no market fluctuations or inflation considered.

**Table 5 Net Decommissioning Cost Summary**

Item	(Cost)/Revenue
Decommissioning Expenses (Solar Project)	<b>(\$12129,015)</b>
Potential Revenue – salvage value of panel components and recoverable materials	<b>\$5,494,624</b>
<b>Net Decommissioning Cost/Revenue</b>	<b>(\$6,634,391)</b>

#### 4.5 FINANCIAL ASSURANCE

Iron Pine Solar will be the financially responsible party for decommissioning the Project and restoring the site to a condition similar to that which existed prior to the Project construction. As recommended in the EERA Guidance, Iron Pine Solar proposes the following schedule of decommissioning cost re-assessment and financial assurance. The schedule is based on Year 0 being the Project date of commissioning.

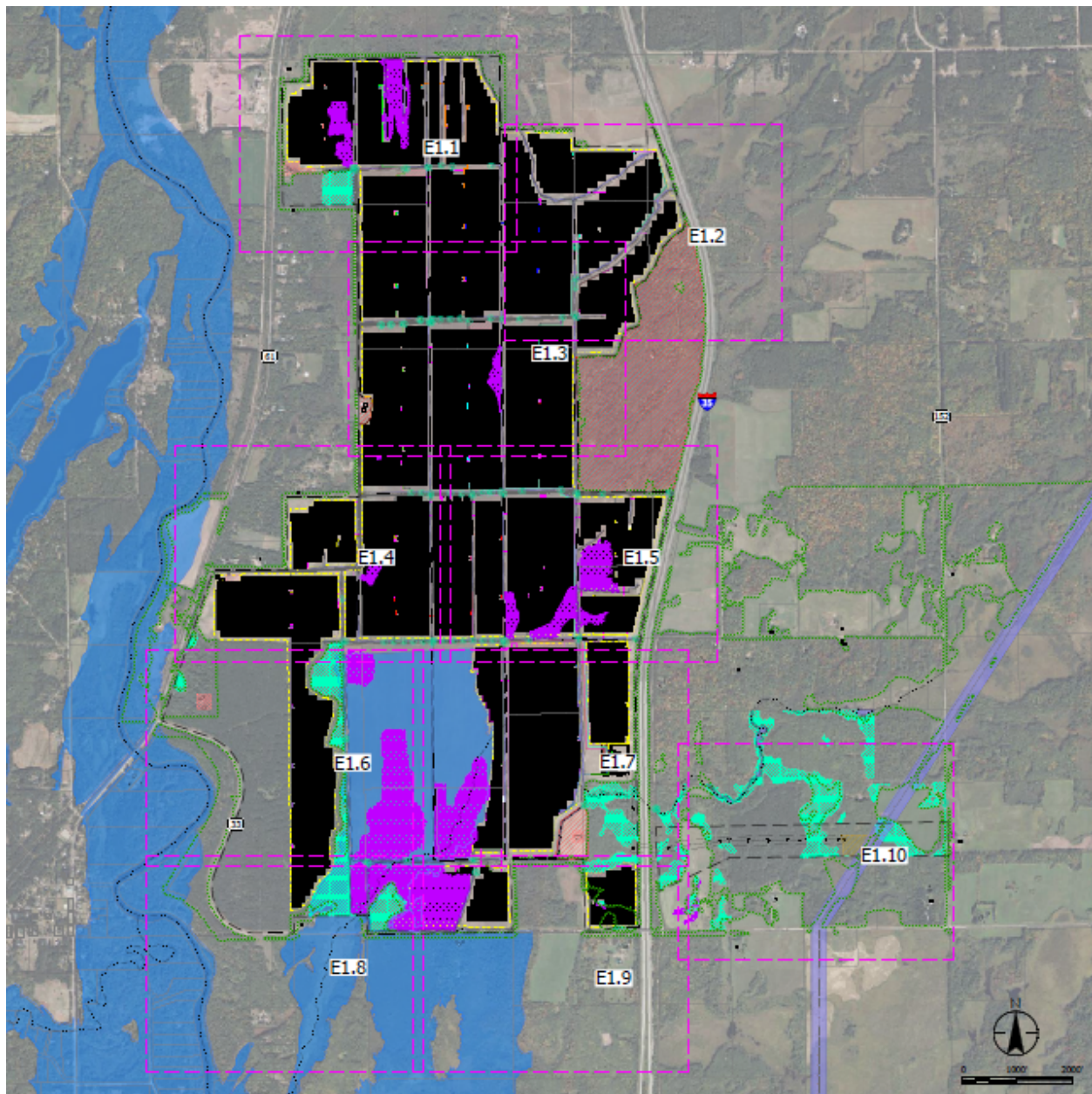
- Year 5 – Re-assessment of the net decommissioning cost; update to be provided to Pine County Zoning Administrator or applicable Pine County officer (Pine County).
- Year 10 – Re-assessment of the net decommissioning cost and issuance of surety bond or other agreed upon method of financial assurance.
- Years 15 through end of Project life – Re-assessment of net decommissioning cost and update of financial assurance.

DECOMMISSIONING PLAN  
IRON PINE SOLAR PROJECT, PINE COUNTY, MINNESOTA

**FIGURE**

DECOMMISSIONING PLAN  
IRON PINE SOLAR PROJECT, PINE COUNTY, MINNESOTA

Figure 1 Proposed Project Layout





## **Appendix G**

### **Draft Route Permit**



STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

ROUTE PERMIT FOR

~~[PROJECT NAME]~~ IRON PINE SOLAR PROJECT GENERATION TIE

A HIGH-VOLTAGE TRANSMISSION LINE AND ASSOCIATED FACILITIES

IN

~~[COUNTY]~~ PINE COUNTY

ISSUED TO

~~[PERMITTEE]~~ IRON PINE SOLAR POWER, LLC

PUC DOCKET NO. ~~[Docket Number]~~ IP-7114/TL-23-415

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850 this route permit is hereby issued to:

~~[Permittee]~~ IRON PINE SOLAR POWER, LLC

~~[Permittee]~~ Iron Pine Solar Power, LLC is authorized by this route permit to construct and operate ~~[Provide a description of the project authorized by the Minnesota Public Utilities Commission]~~ an approximately one mile long 230 kilovolt transmission line in Pine County, Minnesota.

The high-voltage transmission line shall be constructed within the route identified in this route permit and in compliance with the conditions specified in this route permit.

Approved and adopted this \_\_\_\_ day of [Month, Year]

BY ORDER OF THE COMMISSION

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Will Seuffert,  
Executive Secretary

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## ATTACHMENTS

Attachment 1 – Complaint Handling Procedures for Permitted Energy Facilities

Attachment 2 – Compliance Filing Procedures for Permitted Energy Facilities

Attachment 3 – Route Permit Maps

## 1 ROUTE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this route permit to ~~[Permittee Name]~~ Iron Pine Solar Power, LLC (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This route permit authorizes the Permittee to construct and operate an ~~[Provide a description of the project as authorized by the Commission]~~ approximately one mile long 230 kilovolt transmission line and associated switchyard in Pine County, Minnesota (~~[Project Name, if applicable]~~), henceforth known as Transmission Facility). The high-voltage transmission line shall be constructed within the route identified in this route permit and in compliance with the conditions specified in this route permit.

### 1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this route permit shall be the sole route approval required for construction of the transmission facilities and this route permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose governments.

## 2 TRANSMISSION FACILITY DESCRIPTION

~~[Provide a description of the Transmission Facility as authorized by the Commission]~~ Iron Pine Solar Power, LLC will construct, own, and operate approximately one mile of new 230 kilovolt (kV) high voltage transmission line (HVTL) beginning at the Iron Pine Solar project substation located in Kettle River Township and terminating at a switchyard connecting to Minnesota Power's existing Arrowhead-Bear Creek 230 kV transmission line.

The Transmission Facility is located in the following:

County	Township Name	Township	Range	Section
<u>Pine</u>	<u>Kettle River</u>	<u>44</u>	<u>20</u>	<u>25</u>

### 2.1 Structures

~~[Provide a detailed description of the structures authorized by the Commission]~~ The 230 kV line will consist of self-weathering, steel monopoles with direct embedded or concrete pier foundations. Poles will range from 100 to 140 feet in height with spans of 100 to 900 feet.

### 2.2 Conductors

~~[Provide a detailed description of the conductors authorized by the Commission]~~ The single-circuit structures will have three single conductor phase wires and one shield wire. The phase wires are anticipated to be a 1113 kcmil 45/7 ACSR "Bluejay" conductor or a conductor of similar capacity and size. The overhead shield wire is anticipated to be a dual-purpose optical ground wire with a minimum of 24 fibers.

The table below details specifics on the various structure and conductor types as presented in the route permit application.

Line Type	Structure		Foundation	Height <u>(feet)</u>	Span <u>(feet)</u>
	Type	Material			
<u>230 kV</u>	<u>Tangent</u>	<u>Steel</u>	<u>Direct Embed or Concrete</u>	<u>100 – 140</u>	<u>100 - 900</u>
<u>230 kV</u>	<u>Angle</u>	<u>Steel</u>	<u>Direct Embed or Concrete</u>	<u>100 – 140</u>	<u>100 - 900</u>
<u>230 kV</u>	<u>Deadend</u>	<u>Steel</u>	<u>Direct Embed or Concrete</u>	<u>100 – 140</u>	<u>100 - 900</u>

### 2.3 Substations and Associated Facilities

~~[Provide a detailed description of the associated facilities and substations as authorized by the Commission]~~ The 230 kV line will connect to Minnesota Power's existing Arrowhead-Bear Creek 230 kV transmission line via a switchyard.

## 3 DESIGNATED ROUTE

The route designated by the Commission is depicted on the route maps attached to this route permit (Designated Route). The Designated Route is generally described as follows:

~~[Provide detailed description of the authorized route including the route widths and any other specifics relevant to each segment. Also include a reference to the relevant route map to be attached to the route permit.]~~ The 230 kV transmission line will begin at the Iron Pine Solar project substation in Kettle River Township in Pine County, Minnesota. The route will proceed south along Interstate 35 for approximately 1,500 feet. The route will turn eastward and cross Interstate 35. The route will then proceed eastward for approximately 3,780 feet to a new 230 kV switchyard.

The Designed Route includes an anticipated alignment and a right-of-way. The right-of-way is the physical land needed for the safe operation of the transmission line. The Permittee shall locate the alignment and associated right-of-way within the Designated Route unless otherwise authorized by this route permit or the Commission. The Designated Route provides the Permittee with flexibility for minor adjustments of the alignment and right-of-way to accommodate landowner requests and unforeseen conditions.

Any modifications to the Designated Route or modifications that would result in right-of-way placement outside the Designated Route shall be specifically reviewed by the Commission in accordance with Minn. R. 7850.4900 and Section 10 of this route permit.

#### **4 RIGHT-OF-WAY**

This route permit authorizes the Permittee to obtain a new permanent right-of-way for the transmission line up to ~~{number}~~160 feet in width. The permanent right-of-way is typically ~~{number}~~80 feet on both sides of the transmission line measured from its centerline or alignment.

The anticipated alignment is intended to minimize potential impacts relative to the criteria identified in Minn. R. 7850.4100. The final alignment must generally conform to the anticipated alignment identified on the route maps unless changes are requested by individual landowners and agreed to by the Permittee or for unforeseen conditions that are encountered or as otherwise provided for by this route permit.

Any right-of-way or alignment modifications within the Designated Route shall be located so as to have comparable overall impacts relative to the factors in Minn. R. 7850.4100, as does the right-of-way and alignment identified in this route permit, and shall be specifically identified and documented in and approved as part of the plan and profile submitted pursuant to Section 9.1 of this route permit.

Where the transmission line parallels existing highway and other road rights-of-way, the transmission line right-of-way shall occupy and utilize the existing right-of-way to the maximum extent possible; consistent with the criteria in Minn. R. 7850.4100, and the other requirements of this route permit; and for highways under the jurisdiction of the Minnesota Department of Transportation (MnDOT), the procedures for accommodating utilities in trunk highway rights-of-way.

#### **5 GENERAL CONDITIONS**

The Permittee shall comply with the following conditions during construction and operation of the Transmission Facility over the life of this route permit.

##### **5.1 Route Permit Distribution**

Within 30 days of issuance of this route permit, the Permittee shall provide all affected landowners with a copy of this route permit and the complaint procedures. An affected landowner is any landowner or designee that is within or adjacent to the Designated Route. In



no case shall a landowner receive this route permit and complaint procedures less than five days prior to the start of construction on their property. The Permittee shall also provide a copy of this route permit and the complaint procedures to the applicable regional development commissions, county environmental offices, and city and township clerks. The Permittee shall file with the Commission an affidavit of its route permit and complaint procedures distribution within 30 days of issuance of this route permit.

## **5.2 Access to Property**

The Permittee shall notify landowners prior to entering or conducting maintenance within their property, unless otherwise negotiated with the landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of the Minnesota Department of Commerce (Department of Commerce) staff or Commission staff.

## **5.3 Construction and Operation Practices**

The Permittee shall comply with the construction practices, operation and maintenance practices, and material specifications described in the permitting record for this Transmission Facility unless this route permit establishes a different requirement in which case this route permit shall prevail.

### **5.3.1 Field Representative**

The Permittee shall designate a field representative responsible for overseeing compliance with the conditions of this route permit during construction of the Transmission Facility. This person shall be accessible by telephone or other means during normal business hours throughout site preparation, construction, cleanup, and restoration.

The Permittee shall file with the Commission the name, address, email, phone number, and emergency phone number of the field representative at least 14 days prior to the pre-construction meeting. The Permittee shall provide the field representative's contact information to affected landowners, local government units and other interested persons at least 14 days prior to the pre-construction meeting. The Permittee may change the field representative at any time upon notice to the Commission, affected landowners, local government units and other interested persons. The Permittee shall file with the Commission an affidavit of distribution of its field representative's contact information at least 14 days prior to the pre-construction meeting and upon changes to the field representative.

### **5.3.2 Employee Training - Route Permit Terms and Conditions**

The Permittee shall train all employees, contractors, and other persons involved in the Transmission Facility construction regarding the terms and conditions of this route permit. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

### **5.3.3 Independent Third-Party Monitoring**

Prior to any construction, the Permittee shall propose a scope of work and identify an independent third-party monitor to conduct construction monitoring on behalf of the Department of Commerce. The scope of work shall be developed in consultation with and approved by the Department of Commerce. This third-party monitor will report directly to and will be under the control of the Department of Commerce with costs borne by the Permittee. Department of Commerce staff shall keep records of compliance with this section and will ensure that status reports detailing the construction monitoring are filed with the Commission in accordance with scope of work approved by the Department of Commerce.

### **5.3.4 Public Services, Public Utilities, and Existing Easements**

During Transmission Facility construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these shall be temporary, and the Permittee shall restore service promptly. Where any impacts to utilities have the potential to occur the Permittee shall work with both landowners and local entities to determine the most appropriate mitigation measures if not already considered as part of this route permit.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

### **5.3.5 Temporary Workspace**

The Permittee shall limit temporary easements to special construction access needs and additional staging or lay-down areas required outside of the authorized right-of-way. Temporary space shall be selected to limit the removal and impacts to vegetation. The Permittee shall obtain temporary easements outside of the authorized transmission line right-of-way from affected landowners through rental agreements. Temporary easements are not provided for in this route permit.

The Permittee may construct temporary driveways between the roadway and the structures to minimize impact using the shortest route feasible. The Permittee shall use construction mats to

minimize impacts on access paths and construction areas. The Permittee shall submit the location of temporary workspaces and driveways with the plan and profile pursuant to Section 9.1.

#### **5.3.6 Noise**

The Permittee shall comply with noise standards established under Minn. R. 7030.0010 to 7030.0080. The Permittee shall limit construction and maintenance activities to daytime working hours to the extent practicable.

#### **5.3.7 Aesthetics**

The Permittee shall consider input pertaining to visual impacts from landowners or land management agencies prior to final location of structures, rights-of-way, and other areas with the potential for visual disturbance. The Permittee shall use care to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the Transmission Facility during construction and maintenance. The Permittee shall work with landowners to locate the high-voltage transmission line to minimize the loss of agricultural land, forest, and wetlands, and to avoid homes and farmsteads. The Permittee shall place structures at a distance, consistent with sound engineering principles and system reliability criteria, from intersecting roads, highways, or trail crossings.

#### **5.3.8 Soil Erosion and Sediment Control**

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency (MPCA) Construction Stormwater Program. If construction of the Transmission Facility disturbs more than one acre of land or is sited in an area designated by the MPCA as having potential for impacts to water resources, the Permittee shall obtain a National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater Permit from the MPCA that provides for the development of a Stormwater Pollution Prevention Plan that describes methods to control erosion and runoff.

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking. Contours shall be graded as required so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. All areas disturbed during construction of the Transmission Facility shall be returned to pre-construction conditions.

### **5.3.9 Wetlands and Water Resources**

The Permittee shall develop wetland impact avoidance measures and implement them during construction of the Transmission Facility. Measures shall include spacing and placing the power poles at variable distances to span and avoid wetlands, watercourses, and floodplains. Unavoidable wetland impacts as a result of the placement of poles shall be limited to the immediate area around the poles. To minimize impacts, the Permittee shall construct in wetland areas during frozen ground conditions where practicable and according to permit requirements by the applicable permitting authority. When construction during winter is not possible, the Permittee shall use wooden or composite mats to protect wetland vegetation.

The Permittee shall contain soil excavated from the wetlands and riparian areas and not place it back into the wetland or riparian area. The Permittee shall access wetlands and riparian areas using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts. The Permittee shall not place staging or stringing set up areas within or adjacent to wetlands or water resources, as practicable. The Permittee shall assemble power pole structures on upland areas before they are brought to the site for installation.

The Permittee shall restore wetland and water resource areas disturbed by construction activities to pre-construction conditions in accordance with the requirements of applicable state and federal permits or laws and landowner agreements. The Permittee shall meet the USACE, Minnesota Department of Natural Resources (DNR), Minnesota Board of Water and Soil Resources, and local units of government wetland and water resource requirements.

### **5.3.10 Vegetation Management**

The Permittee shall minimize the number of trees to be removed in selecting the right-of-way specifically preserving to the maximum extent practicable windbreaks, shelterbelts, living snow fences, and vegetation in areas such as trail and stream crossings where vegetative screening may minimize aesthetic impacts, to the extent that such actions do not violate sound engineering principles or system reliability criteria.

The Permittee shall remove tall growing species located within the transmission line right-of-way that endanger the safe and reliable operation of the transmission line. The Permittee shall leave undisturbed, to the extent possible, existing low growing species in the right-of-way or replant such species in the right-of-way to blend the difference between the right-of-way and adjacent areas, to the extent that the low growing vegetation that will not pose a threat to the transmission line or impede construction.

### **5.3.11 Application of Pesticides**

The Permittee shall restrict pesticide use to those pesticides and methods of application approved by the Minnesota Department of Agriculture (MDA), DNR, and the U.S. Environmental Protection Agency (EPA). Selective foliage or basal application shall be used when practicable. All pesticides shall be applied in a safe and cautious manner so as not to damage adjacent properties including crops, orchards, tree farms, apiaries, or gardens. The Permittee shall contact the landowner at least 14 days prior to pesticide application on their property. The Permittee may not apply any pesticide if the landowner requests that there be no application of pesticides within the landowner's property. The Permittee shall provide notice of pesticide application to landowners and beekeepers operating known apiaries within three miles of the pesticide application area at least 14 days prior to such application. The Permittee shall keep pesticide communication and application records and provide them upon the request of Department of Commerce staff or Commission staff.

#### **5.3.12 Invasive Species**

The Permittee shall employ best management practices to avoid the potential introduction and spread of invasive species on lands disturbed by Transmission Facility construction activities. The Permittee shall develop an Invasive Species Prevention Plan and file it with the Commission at least 14 days prior to the pre-construction meeting. The Permittee shall comply with the most recently filed Invasive Species Prevention Plan.

#### **5.3.13 Noxious Weeds**

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil the Permittee shall select site appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **5.3.14 Roads**

The Permittee shall advise the appropriate governing bodies having jurisdiction over all state, county, city, or township roads that will be used during the construction phase of the Transmission Facility. Where practical, existing roadways shall be used for all activities associated with construction of the Transmission Facility. Oversize or overweight loads associated with the Transmission Facility shall not be hauled across public roads without required permits and approvals.

The Permittee shall construct the fewest number of site access roads required. Access roads shall not be constructed across streams and drainage ways without the required permits and approvals. Access roads shall be constructed in accordance with all necessary township, county or state road requirements and permits.

The Permittee shall promptly repair private roads or lanes damaged when moving equipment or when accessing construction workspace, unless otherwise negotiated with the affected landowner.

#### **5.3.15 Archaeological and Historic Resources**

The Permittee shall make every effort to avoid impacts to archaeological and historic resources when constructing the Transmission Facility. In the event that a resource is encountered, the Permittee shall consult with the State Historic Preservation Office and the State Archaeologist. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize Transmission Facility impacts on the resource consistent with State Historic Preservation Office and State Archaeologist requirements.

Prior to construction, the Permittee shall train workers about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction. If human remains are encountered during construction, the Permittee shall immediately halt construction and promptly notify local law enforcement and the State Archaeologist. The Permittee shall not resume construction at such location until authorized by local law enforcement or the State Archaeologist. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **5.3.16 Avian Protection**

The Permittee in cooperation with the DNR shall identify areas of the transmission line where bird flight diverters will be incorporated into the transmission line design to prevent large avian collisions attributed to visibility issues. Standard transmission design shall incorporate adequate spacing of conductors and grounding devices in accordance with Avian Power Line Interaction Committee standards to eliminate the risk of electrocution to raptors with larger wingspans that may simultaneously come in contact with a conductor and grounding devices. The Permittee shall submit documentation of its avian protection coordination with the plan and profile pursuant to Section 9.1.

#### **5.3.17 Drainage Tiles**

The Permittee shall avoid, promptly repair, or replace all drainage tiles broken or damaged during all phases of the Transmission Facility's life unless otherwise negotiated with the affected landowner. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

#### **5.3.18 Restoration**

The Permittee shall restore the right-of-way, temporary workspaces, access roads, abandoned right-of-way, and other public or private lands affected by construction of the Transmission Facility. Restoration within the right-of-way must be compatible with the safe operation, maintenance, and inspection of the transmission line. Within 60 days after completion of all restoration activities, the Permittee shall file with the Commission a Notice of Restoration Completion.

#### **5.3.19 Cleanup**

The Permittee shall remove and properly dispose of all construction waste and scrap from the right-of-way and all premises on which construction activities were conducted upon completion of each task. The Permittee shall remove and properly dispose of all personal litter, including bottles, cans, and paper from construction activities daily.

#### **5.3.20 Pollution and Hazardous Wastes**

The Permittee shall take all appropriate precautions to protect against pollution of the environment. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all waste generated during construction and restoration of the Transmission Facility.

#### **5.3.21 Damages**

The Permittee shall fairly restore or compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damages sustained during construction. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

### **5.4 Electrical Performance Standards**

#### **5.4.1 Grounding**



The Permittee shall design, construct, and operate the transmission line in a manner so that the maximum induced steady-state short-circuit current shall be limited to five milliamperes root mean square (rms) alternating current between the ground and any non-stationary object within the right-of-way, including but not limited to large motor vehicles and agricultural equipment. All fixed metallic objects on or off the right-of-way, except electric fences that parallel or cross the right-of-way, shall be grounded to the extent necessary to limit the induced short-circuit current between ground and the object so as not to exceed one milliamperes rms under steady state conditions of the transmission line and to comply with the ground fault conditions specified in the National Electric Safety Code. The Permittee shall address and rectify any induced current problems that arise during transmission line operation.

#### **5.4.2 Electric Field**

The Permittee shall design, construct, and operate the transmission line in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms.

#### **5.4.3 Interference with Communication Devices**

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the Transmission Facility, the Permittee shall take whatever action is necessary to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the Transmission Facility. The Permittee shall keep records of compliance with this section and provide them upon the request of Department of Commerce staff or Commission staff.

### **5.5 Other Requirements**

#### **5.5.1 Safety Codes and Design Requirements**

The Permittee shall design the transmission line and associated facilities to meet or exceed all relevant local and state codes, the National Electric Safety Code, and North American Electric Reliability Corporation requirements. This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements.

#### **5.5.2 Other Permits and Regulations**

The Permittee shall comply with all applicable state statutes and rules. The Permittee shall obtain all required permits for the Transmission Facility and comply with the conditions of



those permits unless those permits conflict with or are preempted by federal or state permits and regulations.

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission an Other Permits and Regulations Submittal that contains a detailed status of all permits, authorizations, and approvals that have been applied for specific to the Transmission Facility. The Other Permits and Regulations Submittal shall also include the permitting agency name; the name of the permit, authorization, or approval being sought; contact person and contact information for the permitting agency or authority; brief description of why the permit, authorization, or approval is needed; application submittal date; and the date the permit, authorization, or approval was issued or is anticipated to be issued.

The Permittee shall demonstrate that it has obtained all necessary permits, authorizations, and approvals by filing an affidavit stating as such and an updated Other Permits and Regulations Submittal prior to commencing construction. The Permittee shall provide a copy of any such permits, authorizations, and approvals at the request of Department of Commerce staff or Commission staff.

## **6 SPECIAL CONDITIONS**

The special conditions shall take precedence over other conditions of this permit should there be a conflict.

### **6.1 Interstate 35 Crossing**

The Permittee shall coordinate with the Minnesota Department of Transportation (MnDOT) regarding the crossing of Interstate 35 by the project transmission line. The Permittee shall construct and operate the crossing consistent with MnDOT's 2557 Standard Specification Book and MnDOT's required height clearances for transmission line crossings of trunk highway/interstate rights-of-way.

## **7 DELAY IN CONSTRUCTION**

If the Permittee has not commenced construction or improvement of the route within four years after the date of issuance of this route permit the Permittee shall file a Failure to Construct Report and the Commission shall consider suspension of this route permit in accordance with Minn. R. 7850.4700.

## **8 COMPLAINT PROCEDURES**

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission the complaint procedures that will be used to receive and respond to complaints.

The complaint procedures shall be in accordance with the requirements of Minn. R. 7829.1500 or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this route permit.

Upon request, the Permittee shall assist Department of Commerce staff or Commission staff with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

## **9 COMPLIANCE REQUIREMENTS**

Failure to timely and properly make compliance filings required by this route permit is a failure to comply with the conditions of this route permit. Compliance filings must be electronically filed with the Commission.

### **9.1 Pre-Construction Meeting**

Prior to the start of construction, the Permittee shall participate in a pre-construction meeting with Department of Commerce and Commission staff to review pre-construction filing requirements, scheduling, and to coordinate monitoring of construction and site restoration activities. Within 14 days following the pre-construction meeting, the Permittee shall file with the Commission a summary of the topics reviewed and discussed and a list of attendees. The Permittee shall indicate in the filing the anticipated construction start date.

### **9.2 Plan and Profile**

At least 14 days prior to the pre-construction meeting, the Permittee shall file with the Commission, and provide the Department of Commerce, and the counties where the Transmission Facility, or portion of the Transmission Facility, will be constructed with a plan and profile of the right-of-way and the specifications and drawings for right-of-way preparation, construction, structure specifications and locations, cleanup, and restoration for the Transmission Facility. The documentation shall include maps depicting the plan and profile including the right-of-way, alignment, and structures in relation to the route and alignment approved per this route permit.

The Permittee may not commence construction until the earlier of (i) 30 days after the pre-construction meeting or (ii) or until the Commission staff has notified the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this route permit.

If the Commission notifies the Permittee in writing within 30 days after the pre-construction meeting that it has completed its review of the documents and planned construction, and finds

that the planned construction is not consistent with this route permit, the Permittee may submit additional and/or revised documentation and may not commence construction until the Commission has notified the Permittee in writing that it has determined that the planned construction is consistent with this route permit.

If the Permittee intends to make any significant changes in its plan and profile or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission, the Department of Commerce, and county staff at least five days before implementing the changes. No changes shall be made that would be in violation of any of the terms of this route permit.

### **9.3 Status Reports**

The Permittee shall file with the Commission monthly Construction Status Reports beginning with the pre-construction meeting and until completion of restoration. Construction Status Reports shall describe construction activities and progress, activities undertaken in compliance with this route permit, and shall include text and photographs.

If the Permittee does not commence construction of the Transmission Facility within six months of this route permit issuance, the Permittee shall file with the Commission Pre-Construction Status Reports on the anticipated timing of construction every six months beginning with the issuance of this route permit until the pre-construction meeting.

### **9.4 In-Service Date**

At least three days before the Transmission Facility is to be placed into service, the Permittee shall notify the Commission of the date on which the Transmission Facility will be placed into service and the date on which construction was completed.

### **9.5 As-Built**

Within 90 days after completion of construction, the Permittee shall submit to the Commission copies of all final as-built plans and specifications developed during the Transmission Facility construction.

### **9.6 GPS Data**

Within 90 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (*e.g.*, ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the Transmission Facility and each substation connected.

## **9.7 Right of Entry**

The Permittee shall allow Commission designated representatives to perform the following, upon reasonable notice, upon presentation of credentials and at all times in compliance with the Permittee's site safety standards:

- (a) To enter upon the facilities easement of the property for the purpose of obtaining information, examining records, and conducting surveys or investigations.
- (b) To bring such equipment upon the facilities easement of the property as is necessary to conduct such surveys and investigations.
- (c) To sample and monitor upon the facilities easement of the property.  
To examine and copy any documents pertaining to compliance with the conditions of this route permit.

## **10 ROUTE PERMIT AMENDMENT**

This route permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this route permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required under Minn. R. 7850.4900.

## **11 TRANSFER OF ROUTE PERMIT**

The Permittee may request at any time that the Commission transfer this route permit to another person or entity (transferee). In its request, the Permittee must provide the Commission with:

- (a) the name and description of the transferee;
- (b) the reasons for the transfer;
- (c) a description of the facilities affected; and
- (d) the proposed effective date of the transfer.

The transferee must provide the Commission with a certification that it has read, understands and is able to comply with the plans and procedures filed for the Transmission Facility and all conditions of this route permit. The Commission may authorize transfer of the route permit after affording the Permittee, the transferee, and interested persons such process as is required under Minn. R. 7850.5000.

## **12 REVOCATION OR SUSPENSION OF ROUTE PERMIT**

The Commission may initiate action to revoke or suspend this route permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend this route permit.

DRAFT PERMIT

## **Appendix H**

### **Information for Planning and Consultation**





# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Minnesota-Wisconsin Ecological Services Field Office  
3815 American Blvd East  
Bloomington, MN 55425-1659  
Phone: (952) 858-0793



In Reply Refer To:  
Project Code: 2025-0025392  
Project Name: Iron Pine Solar

11/27/2024 21:04:45 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

## To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

### Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

### Consultation Technical Assistance

Please refer to our [Section 7 website](#) for guidance and technical assistance, including [step-by-step instructions](#) for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, USDA Rural Development projects, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.



We recommend running the project (if it qualifies) through our **Minnesota-Wisconsin Federal Endangered Species Determination Key (Minnesota-Wisconsin ("D-key"))**. A [demonstration video](#) showing how-to access and use the determination key is available. Please note that the Minnesota-Wisconsin D-key is the third option of 3 available d-keys. D-keys are tools to help Federal agencies and other project proponents determine if their proposed action has the potential to adversely affect federally listed species and designated critical habitat. The Minnesota-Wisconsin D-key includes a structured set of questions that assists a project proponent in determining whether a proposed project qualifies for a certain predetermined consultation outcome for all federally listed species found in Minnesota and Wisconsin (except for the northern long-eared bat- see below), which includes determinations of "no effect" or "may affect, not likely to adversely affect." In each case, the Service has compiled and analyzed the best available information on the species' biology and the impacts of certain activities to support these determinations.

If your completed d-key output letter shows a "No Effect" (NE) determination for all listed species, print your IPaC output letter for your files to document your compliance with the Endangered Species Act.

For Federal projects with a "Not Likely to Adversely Affect" (NLAA) determination, our concurrence becomes valid if you do not hear otherwise from us after a 30-day review period, as indicated in your letter.

If your d-key output letter indicates additional coordination with the Minnesota-Wisconsin Ecological Services Field Office is necessary (i.e., you get a "May Affect" determination), you will be provided additional guidance on contacting the Service to continue ESA coordination outside of the key; ESA compliance cannot be concluded using the key for "May Affect" determinations unless otherwise indicated in your output letter.

**Note: Once you obtain your official species list, you are not required to continue in IPaC with d-keys, although in most cases these tools should expedite your review.** If you choose to make an effects determination on your own, you may do so. If the project is a Federal Action, you may want to review our section 7 step-by-step instructions before making your determinations.

### **Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species**

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain [Life History Information for Listed and Candidate Species](#) on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

### Northern Long-Eared Bats

Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags  $\geq 3$  inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected. For bat activity dates, please review Appendix L in the [Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines](#).

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A monoculture stand of shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

*If none of the above activities are proposed*, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC

species list report for your records.

*If any of the above activities are proposed*, and the northern long-eared bat appears on the user's species list, the federal project user will be directed to either the northern long-eared bat and tricolored bat range-wide D-key or the Federal Highways Administration, Federal Railways Administration, and Federal Transit Administration Indiana bat/Northern long-eared bat D-key, depending on the type of project and federal agency involvement. Similar to the Minnesota-Wisconsin D-key, these d-keys help to determine if prohibited take might occur and, if not, will generate an automated verification letter. Additional information about available tools can be found on the Service's [northern long-eared bat website](#).

### **Whooping Crane**

Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "[Establishment of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States](#)."

### **Other Trust Resources and Activities**

*Bald and Golden Eagles* - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. It is the responsibility of the project proponent to survey the area for any migratory bird nests. If there is an eagle nest on-site while work is on-going, eagles may be disturbed. We recommend avoiding and minimizing disturbance to eagles whenever practicable. If you cannot avoid eagle disturbance, you may seek a [permit](#). A [nest take permit](#) is always required for removal, relocation, or obstruction of an eagle nest. For communication and wind energy projects, please refer to additional guidelines below.

*Migratory Birds* - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of [recommendations that minimize potential impacts to migratory birds](#). Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

*Communication Towers* - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed [voluntary guidelines for minimizing impacts](#).

*Transmission Lines* - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to [guidelines](#) developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

*Wind Energy* - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's [Wind Energy Guidelines](#). In addition, please refer to the Service's [Eagle Conservation Plan Guidance](#), which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

### **State Department of Natural Resources Coordination**

While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. **Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.**

#### *Minnesota*

[Minnesota Department of Natural Resources - Endangered Resources Review Homepage](#)

Email: [Review.NHIS@state.mn.us](mailto:Review.NHIS@state.mn.us)

#### *Wisconsin*

[Wisconsin Department of Natural Resources - Endangered Resources Review Homepage](#)

Email: [DNRERReview@wi.gov](mailto:DNRERReview@wi.gov)

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

#### Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

## **OFFICIAL SPECIES LIST**

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

### **Minnesota-Wisconsin Ecological Services Field Office**

3815 American Blvd East

Bloomington, MN 55425-1659

(952) 858-0793

## PROJECT SUMMARY

Project Code: 2025-0025392

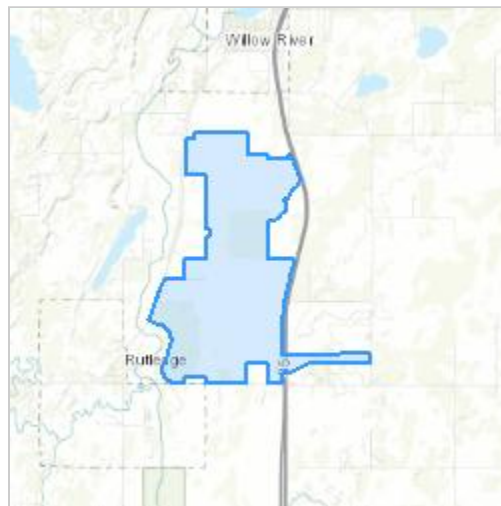
Project Name: Iron Pine Solar

Project Type: Power Gen - Solar

Project Description: The Project will consist of an approximately 2,207-acre solar facility located in Kettle River Township in Pine County. The high voltage transmission line will consist of approximately 5,275 feet of 230 kV line located in Kettle River Township in Pine County. As proposed, the transmission line will start at the solar energy generating system's collector substation and extend to Minnesota Power's Arrowhead-Bear Creek 230 kV transmission line. The transmission line has the sole purpose of delivering the output of the associated solar energy generating system to the transmission grid. The enclosed Project Area map depicts the proposed Project.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.2809052,-92.83665508776522,14z>



Counties: Pine County, Minnesota

## ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

NAME	STATUS
Canada Lynx <i>Lynx canadensis</i> Population: Wherever Found in Contiguous U.S. There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/3652">https://ecos.fws.gov/ecp/species/3652</a>	Threatened
Gray Wolf <i>Canis lupus</i> Population: MN There is <b>final</b> critical habitat for this species. Your location does not overlap the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/4488">https://ecos.fws.gov/ecp/species/4488</a>	Threatened

## BIRDS

NAME	STATUS
Whooping Crane <i>Grus americana</i> Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Experimental Population, Non- Essential

## INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9743">https://ecos.fws.gov/ecp/species/9743</a>	Candidate

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

## USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act<sup>1</sup> and the Migratory Bird Treaty Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats<sup>3</sup>, should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the ["Supplemental Information on Migratory Birds and Eagles"](#).

- 
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
  2. The [Migratory Birds Treaty Act](#) of 1918.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a>	Breeds Dec 1 to Aug 31

## PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

### Breeding Season (■)

Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

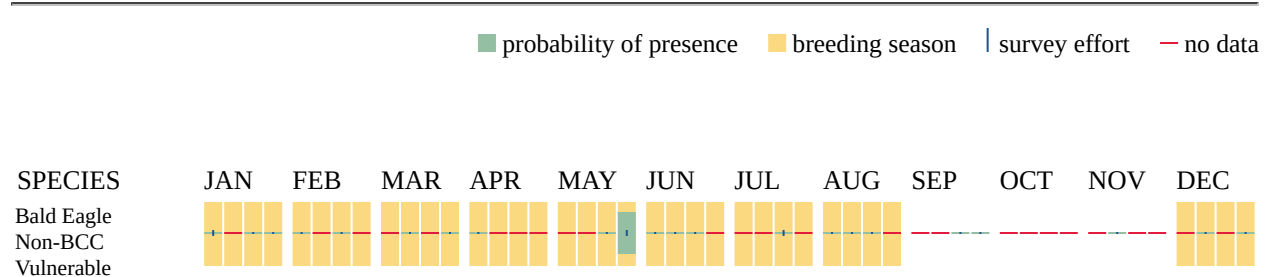


**Survey Effort (|)**

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

**No Data (—)**

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

## MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats<sup>3</sup> should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "[Supplemental Information on Migratory Birds and Eagles](#)".

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
<b>Bald Eagle <i>Haliaeetus leucocephalus</i></b> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a>	Breeds Dec 1 to Aug 31
<b>Bobolink <i>Dolichonyx oryzivorus</i></b> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. <a href="https://ecos.fws.gov/ecp/species/9454">https://ecos.fws.gov/ecp/species/9454</a>	Breeds May 20 to Jul 31
<b>Veery <i>Catharus fuscescens fuscescens</i></b> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA <a href="https://ecos.fws.gov/ecp/species/11987">https://ecos.fws.gov/ecp/species/11987</a>	Breeds May 15 to Jul 15

## PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

### Breeding Season (■)

Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

### Survey Effort (|)

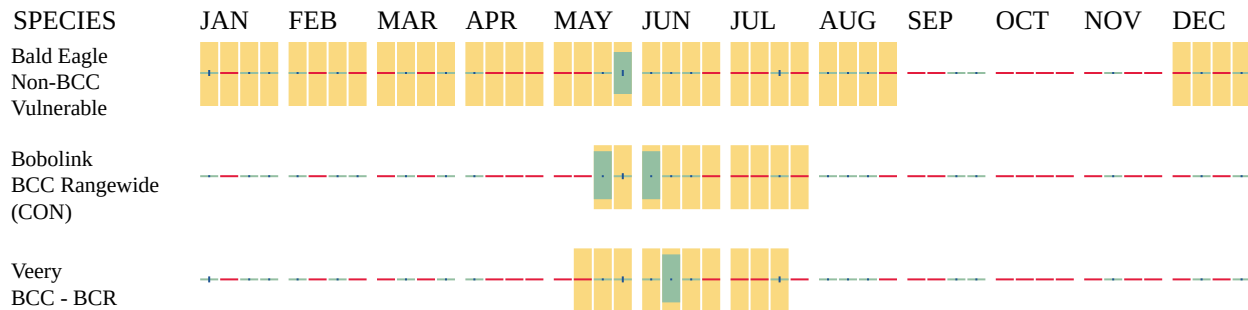
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

### No Data (—)

A week is marked as having no data if there were no survey events for that week.

---

■ probability of presence   ■ breeding season   | survey effort   — no data



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

## WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

### FRESHWATER FORESTED/SHRUB WETLAND

- PSS3/4Dg
- PSS1A
- PFO1A
- PSS1D
- PFO1Ad
- PSS1Dd
- PSS1C
- PFO1/4Dd
- PSS1Ad

RIVERINE

- R5UBFx
- R4SBC
- R2UBH
- R5UBH
- R2UBFx

FRESHWATER EMERGENT WETLAND

- PEM1Ad
- PEM1D
- PEM1Af
- PEM1C

FRESHWATER POND

- PUBHx

## **IPAC USER CONTACT INFORMATION**

Agency: Barr Engineering Co.  
Name: David Haar  
Address: 4300 MarketPointe Dr Suite 200  
City: Minneapolis  
State: MN  
Zip: 55345  
Email: dhaar@barr.com  
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## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Minnesota-Wisconsin Ecological Services Field Office  
3815 American Blvd East  
Bloomington, MN 55425-1659  
Phone: (952) 858-0793



In Reply Refer To:  
Project code: 2025-0025392  
Project Name: Iron Pine Solar

11/27/2024 21:07:45 UTC

Subject: Verification letter for 'Iron Pine Solar' for specified threatened and endangered species that may occur in your proposed project location consistent with the Minnesota-Wisconsin Endangered Species Determination Key (Minnesota-Wisconsin DKey).

Dear David Haar:

The U.S. Fish and Wildlife Service (Service) received on **November 27, 2024** your effect determination(s) for the 'Iron Pine Solar' (Action) using the Minnesota-Wisconsin DKey within the Information for Planning and Consultation (IPaC) system. You have submitted this key to satisfy requirements under Section 7(a)(2). The Service developed this system in accordance of with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C 1531 et seq.).

Based on your answers and the assistance of the Service's Minnesota-Wisconsin DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Canada Lynx ( <i>Lynx canadensis</i> )	Threatened	NLAA
Gray Wolf ( <i>Canis lupus</i> )	Threatened	NLAA
Monarch Butterfly ( <i>Danaus plexippus</i> )	Candidate	No effect
Whooping Crane ( <i>Grus americana</i> )	Experimental Population, Non-Essential	No effect

## **Determination Information**

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for Federally listed species in Minnesota and Wisconsin. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Minnesota-Wisconsin Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Minnesota-Wisconsin

Ecological Services Field Office may request additional information to verify the effects determination reached through the Minnesota-Wisconsin DKey.

### **Additional Information**

**Sufficient project details:** Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

**Future project changes:** The Service recommends that you contact the Minnesota-Wisconsin Ecological Services Field Office or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

**For non-Federal representatives:** Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. Please include the Federal action agency in additional correspondence regarding this project.

### **Species-specific information**

**Gray Wolf:** Please notify the Service if there is observed gray wolf activity during project implementation that could indicate a den or rendezvous site in close proximity (e.g., multiple wolves observed).

**Bald and Golden Eagles:** Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “... to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

**Coordination with the Service is not complete if additional coordination is advised above for any species.**

**Action Description**

You provided to IPaC the following name and description for the subject Action.

**1. Name**

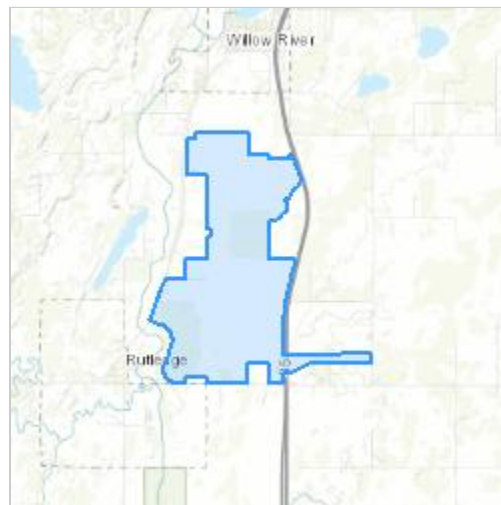
Iron Pine Solar

**2. Description**

The following description was provided for the project 'Iron Pine Solar':

The Project will consist of an approximately 2,207-acre solar facility located in Kettle River Township in Pine County. The high voltage transmission line will consist of approximately 5,275 feet of 230 kV line located in Kettle River Township in Pine County. As proposed, the transmission line will start at the solar energy generating system's collector substation and extend to Minnesota Power's Arrowhead-Bear Creek 230 kV transmission line. The transmission line has the sole purpose of delivering the output of the associated solar energy generating system to the transmission grid. The enclosed Project Area map depicts the proposed Project.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.2809052,-92.83665508776522,14z>





## QUALIFICATION INTERVIEW

1. This determination key is intended to assist the user in evaluating the effects of their actions on Federally listed species in Minnesota and Wisconsin. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Additionally, this key DOES NOT cover wind development, purposeful take (e.g., for research or surveys), communication towers that have guy wires or are over 450 feet in height, aerial or other large-scale application of any chemical (such as insecticide or herbicide), and approval of long-term permits or plans (e.g., FERC licenses, HCP's).

Click **YES** to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

*Yes*

2. Is the action being funded, authorized, or carried out by a Federal agency?

*Yes*

3. Are you the Federal agency or designated non-federal representative?

*No*

4. Does the action involve the installation or operation of wind turbines?

*No*

5. Does the action involve purposeful take of a listed animal?

*No*

6. Does the action involve a new communications tower?

*No*

7. Does the activity involve aerial or other large-scale application of ANY chemical, including pesticides (insecticide, herbicide, fungicide, rodenticide, etc)?

*No*

8. Will your action permanently affect local hydrology?

*No*

9. Will your action temporarily affect local hydrology?

*No*

10. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new stormwater outfall discharge, dams, other in-stream work, etc.)?

*No*

11. Does your project have the potential to impact the riparian zone or indirectly impact a stream/river (e.g., cut and fill; horizontal directional drilling; construction; vegetation removal; pesticide or fertilizer application; discharge; runoff of sediment or pollutants; increase in erosion, etc.)?

**Note:** Consider all potential effects of the action, including those that may happen later in time and outside and downstream of the immediate area involved in the action.

Endangered Species Act regulation defines "effects of the action" to include all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (50 CFR 402.02).

No

12. Will your action disturb the ground or existing vegetation?

**Note:** This includes any off-road vehicle access, soil compaction (enough to collapse a rodent burrow), digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application (herbicide, fungicide), vegetation management (including removal or maintenance using equipment or prescribed fire), cultivation, development, etc.

Yes

13. Will your action include spraying insecticides?

No

14. Does your action area occur entirely within an already developed area?

**Note:** Already developed areas are already paved, covered by existing structures, manicured lawns, industrial sites, or cultivated cropland, AND do not contain trees that could be roosting habitat. Be aware that listed species may occur in areas with natural, or semi-natural, vegetation immediately adjacent to existing utilities (e.g. roadways, railways) or within utility rights-of-way such as overhead transmission line corridors, and can utilize suitable trees, bridges, or culverts for roosting even in urban dominated landscapes (so these are not considered "already developed areas" for the purposes of this question). If unsure, select NO..

No

15. Have you determined that the action will have no effect on individuals within the whooping crane nonessential experimental population (NEP)?

Yes

16. Is there any potential for this action to harm Canada lynx directly (e.g., mammal trapping, poison bait, broadcasting disease control agents for wild animals, capturing animals for research projects, or regular human activity that may exclude lynx from forested habitat including blasting or explosives)?

No

17. Is your action associated with the U.S. Forest Service?

No

18. Is there any potential for this action to harm Canada lynx indirectly (e.g., increased traffic volume and speed that may result in vehicle strikes, regular human activity that may disturb or exclude lynx from forested habitat, blasting or explosives)?

No

19. Will the action result in changes to Canada lynx or snowshoe hare habitat quality, quantity, or availability that is greater than 10 acres?

E.g., thinning and/or other timber management and logging practices; residential and commercial development; road, railroad and utility corridors development; mining activities; prescribed fire; trail development; winter activities that compact snow such as winter road use, snowmobiling, cross country skiing, and dog sledding.

No

20. Is there any potential for the action to harm wolves directly (e.g., mammal trapping, poison bait), or indirectly (e.g., increasing vehicle use that may result in vehicle strikes, exposure to potential human persecution)?

No

21. [Hidden Semantic] Does the action area intersect the Threatened gray wolf AOI?

**Automatically answered**

Yes

22. [Hidden Semantic] Does the action area intersect the monarch butterfly species list area?

**Automatically answered**

Yes

23. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project.

Are you making a "no effect" determination for monarch?

Yes

## **IPAC USER CONTACT INFORMATION**

Agency: Barr Engineering Co.  
Name: David Haar  
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City: Minneapolis  
State: MN  
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Email: dhaar@barr.com  
Phone: 9528423625

## **LEAD AGENCY CONTACT INFORMATION**

Lead Agency: Army Corps of Engineers

## **Appendix I**

### **Natural Heritage Review**





Minnesota Department of Natural Resources  
Division of Ecological & Water Resources  
500 Lafayette Road, Box 25  
St. Paul, MN 55155-4025

January 31, 2024

Correspondence # MCE 2023-00842

Jennifer Kamm  
Stantec

RE: Natural Heritage Review of the proposed **Iron Pine Solar Project**,  
Pine County

Dear Jennifer Kamm,

As requested, the [Minnesota Natural Heritage Information System](#) has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

*Ecologically Significant Areas*

- The proposed project is directly adjacent to two areas preliminarily identified by the Minnesota Biological Survey (MBS) as Sites of Outstanding (**Lower Kettle River**) or Moderate (**Banning North**) Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as Outstanding contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present in the state. Sites ranked as Moderate contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery.

The proposed project is directly adjacent to [Dry Barrens Oak Savanna \(Southern\) Jack Pine Subtype](#) (UPS14a1), a rare MN DNR Native Plant Community (NPC), which is considered **critically imperiled** (S1) in Minnesota.

Development activities can negatively affect adjacent native plant communities, especially through the introduction of invasive plant species. As such, disturbance near these ecologically

significant areas should be minimized. Actions to minimize disturbance may include, but are not limited to, the following recommendations:

- Retain a buffer between proposed activities and both the MBS Site and NPCs.
- Use effective erosion prevention and sediment control measures.
- If possible, conduct the work under frozen ground conditions.
- Inspect and clean all equipment prior to bringing it to the Site to prevent the introduction and spread of invasive species.
- As much as possible, operate within already-disturbed areas.
- Revegetate disturbed soil with [native species suitable to the local habitat](#) as soon after construction as possible.
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (*Lotus corniculatus*) and crown vetch (*Coronilla varia*), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.
- For additional information regarding solar projects, please see [Commercial Solar Siting Guidance](#).

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the Explore page in [Minnesota Conservation Explorer](#) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Please contact the [NH Review Team](#) if you need assistance accessing the data. Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data. To receive a list of MBS Sites of Biodiversity Significance and DNR Native Plant Communities in the vicinity of your project, create a [Conservation Planning Report](#) using the Explore Tab in [Minnesota Conservation Explorer](#).

#### *State-listed Species*

- Several state-listed aquatic species have been documented in the Kettle River in the vicinity of the proposed project. These aquatic species are particularly vulnerable to deterioration in water quality, especially increased siltation. Given streams in the vicinity of the proposed project flow into the Kettle River, **it is important that effective erosion prevention and sediment control practices are implemented and maintained for the duration of the project and incorporated into any stormwater management plan.**
- The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Even if there are no bat records listed nearby, all seven of Minnesota's bats, including the federally endangered northern long-eared bat ([Myotis septentrionalis](#)), can be found throughout Minnesota. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both



live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, **the DNR recommends that tree removal be avoided from June 1 through August 15.**

- Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of these species and recommended measures to avoid or minimize impacts.

#### *Federally Protected Species*

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).

#### *Environmental Review and Permitting*

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, **the results of this Natural Heritage Review are valid for one year**; the results are only valid for the project location and project description provided with the request. If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the [Natural Heritage Review website](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your [DNR Regional Environmental Assessment Ecologist](#).

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

A handwritten signature in black ink that reads "Molly Barrett". The script is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Molly Barrett

Natural Heritage Review Specialist

[Molly.Barrett@state.mn.us](mailto:Molly.Barrett@state.mn.us)

Cc: [Jessica Parson](#), Regional Environmental Assessment Ecologist, Region 2 (Northeast)

Cc: [Cynthia Warzecha](#), Energy Projects Review