Appendix E

Prime Farmland Analysis

Prime Farmland Analysis

Boswell Solar Project,
Itasca County, Minnesota

Prepared for:
Minnesota Power

December 2024

Prime Farmland Analysis

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Contents

Tables

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1 Introduction

On behalf of and in coordination with Minnesota Power, Barr Engineering Co. (Barr) developed this Prime Farmland Analysis (PFA) to address siting a utility-scale solar energy project on Minnesota soils designated as prime farmland. The Boswell Solar Project (Project) is an up to 85-megawatt alternating current (MWac) photovoltaic (PV) solar energy generating facility in Itasca County, Minnesota directly west of the existing Boswell Energy Center (Map 1).

This PFA follows the Solar Energy Production and Prime Farmland Guidance for Evaluating Prudent and Feasible Alternatives (the Guidance) issued by the Minnesota Department of Commerce on May 19, 2020 (reference (1)). The Guidance assists developers in defining factors to consider and describes the necessary steps to develop a permittable solar project on prime farmland and show whether an exception to the prime farmland exclusion is warranted. This assessment supports pertinent sections of the Site Permit Application (Application).

The following presents:

- a summary of the prime farmland exclusion rule found in Minnesota Rules 7850.4400, subp. 4 (Rule)
- a Project description
- an analysis of siting constraints (which addresses factors driving choice of region where the Project is located and assessment of a suitable site for compliance with the Rule)
- and a description of mitigative measure and offsetting benefits according to the Guidance

The assessment shows there are no feasible and prudent alternatives to the proposed Project location and therefore Minnesota Power has complied with the Rule and the Project can occupy more than 0.5 acre of prime farmland per MW.

2 Prime Farmland Exclusion Rule

In the Guidance, EERA indicates “expansion of solar development frequently conflicts with the Public Utilities Commission (PUC) Rule to exclude energy generating installations from prime farmland (a federal designation of soil types). Specifically, no such installation may be permitted that includes more than 0.5 acre of prime farmland per MW of net generating capacity unless the project qualifies for an exemption from the Rule or there is no feasible and prudent alternative to the chosen location.” (reference (1))

Specifically, Minnesota Rule 7850.4400, subpart 4, states:

> *No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoir or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative. Economic considerations alone do not justify the use of more prime farmland. "Prime farmland" means those soils that meet the specifications of Code of Federal Regulations 1980, title 7, section 657.5, paragraph (a). These provisions do not apply to areas located within home rule charter or statutory cities; areas located within two miles of home rule charter or statutory cities of the first, second, and third class; or areas designated for orderly annexation under Minnesota Statutes, section 414.0325.*

The following assessment considers the above Rule, the Guidance, and the PUC’s recent orders considering the Rule for other solar energy projects permitted by the PUC.

3 Project Description

The Project is an up to 85-megawatt alternating current (MWac) photovoltaic (PV) solar energy generating facility in Itasca County, Minnesota. Parts of the Project are within the city of Cohasset, unincorporated Itasca County, and the Leech Lake Band of Ojibwe (LLBO) Reservation[1] (Map 1). Given the Project's 85-MWac size, the Rule requires this analysis if more than 42.5 acres of prime farmland are developed.

Minnesota Power proposes to build the Project within an area of approximately 1,344.5 acres of private land (Site), of which 498.6 acres will be for the operation of the Project (Anticipated Development Area). The "Anticipated Development Area" is a smaller area contained within the Site, and is the anticipated area required to operate the Project. In other words, the Anticipated Development Area is the operational footprint of the Site, and the areas outside of it but within the Site may be necessary only for temporary construction workspace.

The Site includes 256.3 acres of prime farmland, and the Anticipated Development Area includes 119.1 acres of prime farmland (Map 2). Table 3-1 summarizes total prime farmland and prime farmland if drained within both the Site and Anticipated Development Area and provides a breakdown of whether those areas are within the city of Cohasset, unincorporated Itasca County, or the LLBO Reservation.

Table 3-1 Prime Farmland Within Site and Anticipated Development Area

Location	Prime Farmland (acres)	Prime Farmland if drained (acres)
Site		
LLBO Reservation	7.6	65.5
unincorporated Itasca County	14.8	156.3
city of Cohasset	12.1	0
Total	**34.5**	**221.8**
Anticipated Development Area		
LLBO Reservation	5.9	27.0
unincorporated Itasca County	0.0	86.2
city of Cohasset	0.0	0.0
Total	**5.9**	**113.2**

The purpose of the Project is to fulfill Minnesota Power's 15-year Integrated Resource Plan (IRP) to provide 100% carbon-free energy by 2050. The IRP calls for adding up to 300 megawatts (MWs) of regional solar energy. In addition, the Project will offset the cession of coal operations at the Boswell Energy Center Unit 3 by December 31, 2029, and Boswell Unit 4 by 2035 (reference (2))

Minnesota Power is proposing the Project, in part, to offset the cession of coal operations at the Boswell Energy Center. The Project will be developed near the Boswell Energy Center (Map 1) and on lands mostly owned by Minnesota Power (Map 3).

[1] Prime farmland within the limits of the LLBO Reservation and within the limits of the city of Cohasset may not be subject to the Prime Farmland Exclusion Rule. However, prime farmland within these jurisdictions is included in the total acreages provided throughout this assessment for the purposes of a conservation and holistic representation.

Agricultural land use within the Site is primarily occurring within the parcels that Minnesota Power will lease and includes soybeans, wheat, and some hay. Where prime farmland intersects these agricultural practices, the prime farmland will be taken out of production for the lifetime of the Project. However, Minnesota Power will return the land to its original use (agriculture) after decommissioning.

4 Factors Driving Choice of Region

Minnesota Power did not consider alternative regions other than the Site because of the opportunity to:

- replace electric generation from coal with solar energy
- interconnect to the existing Boswell Energy Center Substation
- use the existing Boswell Energy Center facilities for operation and maintenance

With the retirement of coal-fired generation at the Boswell Energy Center, the Boswell Energy Center Substation has capacity to accommodate solar generation as a result of the Project. Minnesota Power noted in their 2021 IRP that they planned to add 300 MW of solar that leverages the Boswell site or other Minnesota Power facilities. The Project will fulfill a part of the IRP's plan once operational.

Other regions were not considered at this time because they do not have the added benefit of the available capacity when compared to the Boswell Energy Center Substation.

5 Factors to Consider When Prime Farmland is Present

Total prime farmland within the Site is comparable to the total percentage of prime farmland within a five-mile radius. A total of 20% of the Site is considered prime farmland and a total of 21% of the area within a five-mile radius of the Site is considered prime farmland (Table 5-1).

Table 5-1 Prime Farmland Acreages: Site vs 5-Mile Radius

Classification	Boswell Solar Project Site (Ac)	Boswell Solar Project Site (%)	5-Mile Radius (Ac)	5-Mile Radius (%)
All areas are prime farmland	34.5	3%	7,079.4	9%
Prime farmland if drained	221.9	17%	9,836.6	12%
Farmland of statewide importance	289.4	22%	11,469.1	14%
Not prime farmland	798.7	59%	50,813.9	64%
TOTALS	**1,344.5**	**100%**	**79,199.1**	**100**

Minnesota Power's main driver during the site selection process was proximity to the existing Boswell Energy Center Substation. The Project layout currently includes a 2.51-mile transmission line and allows energy generation close to the retiring coal operations at the Boswell Energy Center. Other factors considered included land ownership, land use, land cover, and sensitive environmental resources (e.g., wetlands and surface waters).

Minnesota Power owns much of the land required for the Site (Map 3) which is typically not designated as prime farmland (Map 4). While Minnesota Power optimized potential use of land they own, they also avoid public lands (Map 3).

Beyond the industrial land use within the Site, other nearby land uses constrained options for siting the Project. For example, Highway 2 is located north of the Project and an existing railroad is parallel to Highway 2 (Map 1). Additionally, incorporated areas including the cities of Deer River, Zemple, and Grand Rapids are within four miles of the Project. These existing land uses constrained options for siting the Project north of Boswell Energy Center in areas within a five-mile radius that are not designated as prime farmland (Map 5).

Areas not designated as prime farmland are present immediately west, south, and east of the Site (Map 5). Factors considered in these areas primarily included land cover and sensitive environmental resources. Potential siting areas immediately west of the Site are predominantly forested wetlands (Map 6) with sparse upland, forested areas (Map 7). Wetlands are regulated by the USACE under the Clean Water Act (CWA) and the Local Government Unit under the Wetland Conservation Act (WCA). The CWA and WCA require that projects avoid, minimize, or mitigate project related wetland impacts making it impractical to develop in these locations.

Potential siting areas immediately south of the Site are constrained by the Mississippi River and its associated floodplain (Map 4). Potential siting areas immediate east of the Site are constrained by surface waters (Map 6) and a continuation of the forested land cover (Map 7) that is also present within the Project Area but avoided within the Anticipated Area of Development.

5.1 Good Faith Consideration of Non-Prime Farmland Sites Near Interconnection Site

Minnesota Power considered two “variation sites” before selecting the final Site.

The first variation, Variation Site A, considered developing the solar facility solely on lands Minnesota Power owns and potentially minimizing total impacts to prime farmland. Area that was considered as part of this variation that is not a part of the current Site is shown on (Map 4). Some of the area includes prime farmlands so avoidance would not be feasible (Map 4). Variation A and the Site have comparable amounts of prime farmland (Table 5-2). This area was ultimately not selected because of the presence of wetlands and regulatory concerns with the CWA and WCA (Map 6).

The second variation, Variation Site B, included parcels privately owned which requires Minnesota Power to acquire additional leases. Area that was considered as part of this variation that is not a part of the current Site is shown on (Map 4). These areas were ultimately not selected for two reasons. First, they would be less cost effective given the additional length of cable runs that would have been required to connect the smaller areas. Second, they would involve more impacts to agricultural lands and farmed wetlands, particularly within the LLBO Reservation. Variation B has more prime farmland than the Site (Table 5-2).

Table 5-2 Prime Farmland Acreages: Site vs Variation A and B

Classification	Boswell Solar Project (Acres (%))	Variation A (Acres (%))	Variation B (Acres (%))
All areas are prime farmland	34.5 (3%)	228.8 (19%)	39.3 (8%)
Prime farmland if drained	221.9 (17%)	27.9 (2%)	360 (70%)
Farmland of statewide importance	289.4 (22%)	207.9 (17%)	26.9 (5%)
Not prime farmland	798.7 (59%)	749.6 (62%)	90.9 (18%)
TOTALS	**1,344.5 (100%)**	**1,214.2 (100%)**	**517.7 (100%)**

5.2 Site Selection & Avoidance of Other Prohibited Areas

During the site selection process, prohibited sites were identified and avoided. Prohibited areas are defined in Minnesota Administrative Rule 7850.4400 and include national parks, state parks, and state scientific and natural areas. As discussed in the Application, no prohibited areas per Minnesota Administrative Rule 7850.4400 are within the Site or Anticipated Area of Development. The Mississippi River is designated as a State Water Trail which is a site exclusion when alternative sites exist (7850.4400 Subp. 3(H)). However, the Project will not disturb the Mississippi River.

5.3 Good Faith Consideration of Alternative Site Configurations or Technologies

Alternative site configurations considered are summarized in Section 5.1 as Variation A and B. In addition to these configurations, Minnesota Power also considered developing solar within the Boswell Ash Cell. This area is shown in (Map 4) as Variation C. It does not contain any area designated as prime farmland. This area was ultimately not selected because of the technology it would require and for regulatory

reasons. Variation C would require a fixed tile array. The Project will use PV panels with racking systems designed to track the sun and tilt to different angles throughout the day. Variation C would ultimately require a higher capital cost per MWh than the currently proposed Project. Additionally, the Environmental Protection Agency (EPA) recently modified the Coal Combustion Residuals (CCR) Legacy Surface Impoundment Rule. Given the recent EPA changes, it is possible the solar panels may require removal in the future if Minnesota Power must reclose this impoundment to meet new closure standards.

6 Mitigative Measures and Offsetting Benefits

As noted in the Guidance, a “critical determination could be any mitigations employed by the developer or any offsetting benefits inherent in the location or installation of a particular facility.”

As part of the Application, Minnesota Power prepared an Agricultural Impact Mitigation Plan (AIMP) and a Vegetation Management Plan (VMP) to minimize Project impacts such as soil compaction, topsoil mixing, soil erosion, invasive and noxious weed species, and rutting. The measures outlined in the AIMP will allow agricultural lands within the Site to return to agricultural production upon Project decommissioning.

Through implementation of the VMP, Minnesota Power will establish native perennial vegetation that is compatible with Project operations and maintenance needs, while improving the soils which may also improve future agricultural land use within the Site.

These plans represent Project mitigative measures and offsetting benefits for the prime farmland and future use of the agricultural land for agricultural purposes at the end of the Project’s useful life.

7 Conclusions

Minnesota Power concludes that there is no feasible and prudent alternative to the Site and an exception to Minnesota Rule 7850.4400, Subpart 4 is warranted. As outlined above, the primary reasons supporting this conclusion are as follows:

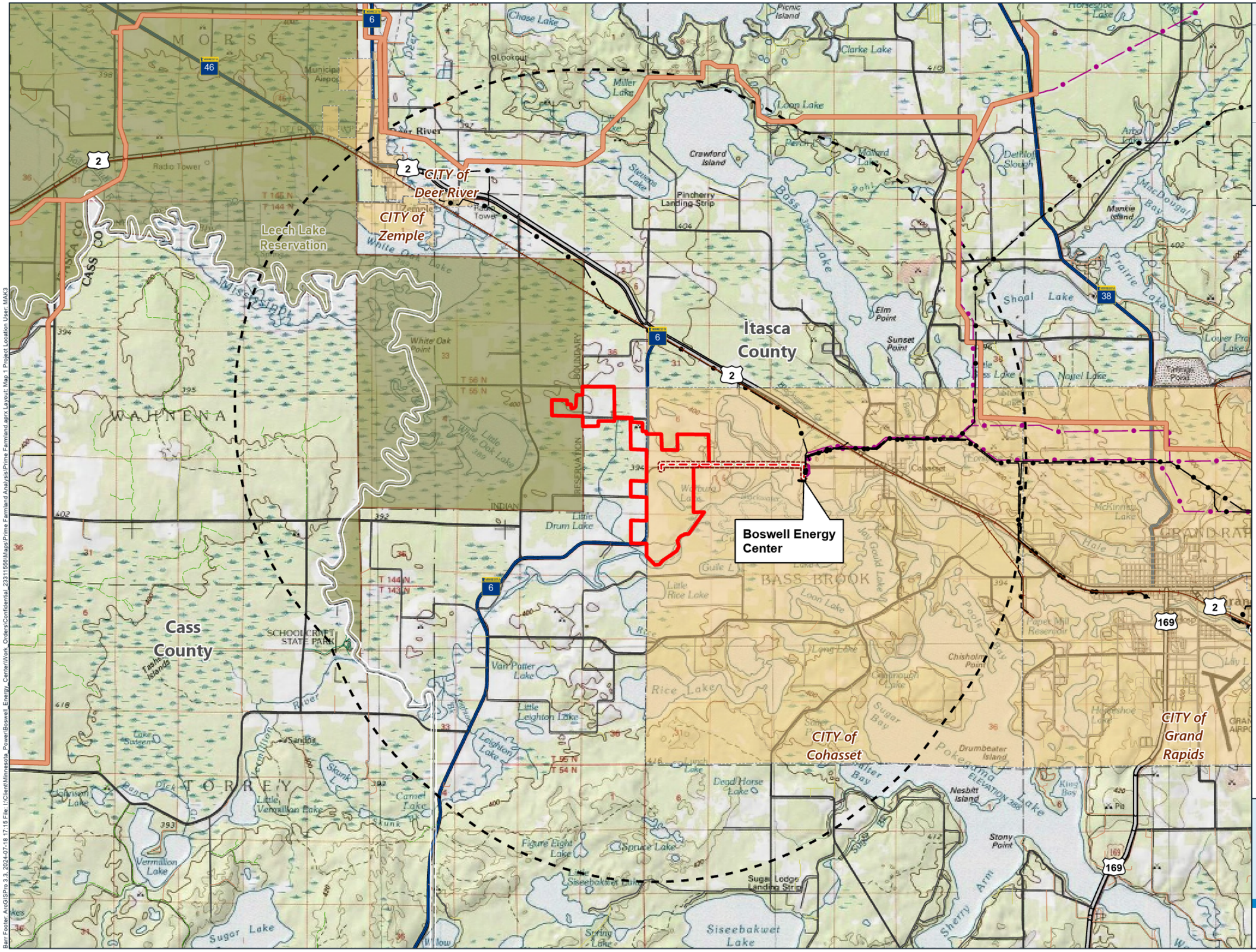
- Proximity to the existing Boswell Energy Center and Substation
- Land ownership, prioritizing lands already owned by Minnesota Power
- Need to minimize length of transmission line to reduce impacts to environmental impacts and avoid crossing Highway 2
- Avoidance of heavily forested areas and wetlands/surface waters

8 References

1. **Minnesota Dpartment of Commerce.** Solar Energy Production and Prime Farmland: Guidance for Evaluating Prudent and Feasible Alternatives. May 19, 2020.

2. **Minnesota Public Utilities Commission.** Order approving plan and setting additional requirements: In the Matter of Minnesota Power's 2021-2035 Integrated Resource Plan. January 9, 2023. Docket No. E-015/RP-21-33.

Maps



PROJECT LOCATION
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Minnesota Power

Map 1

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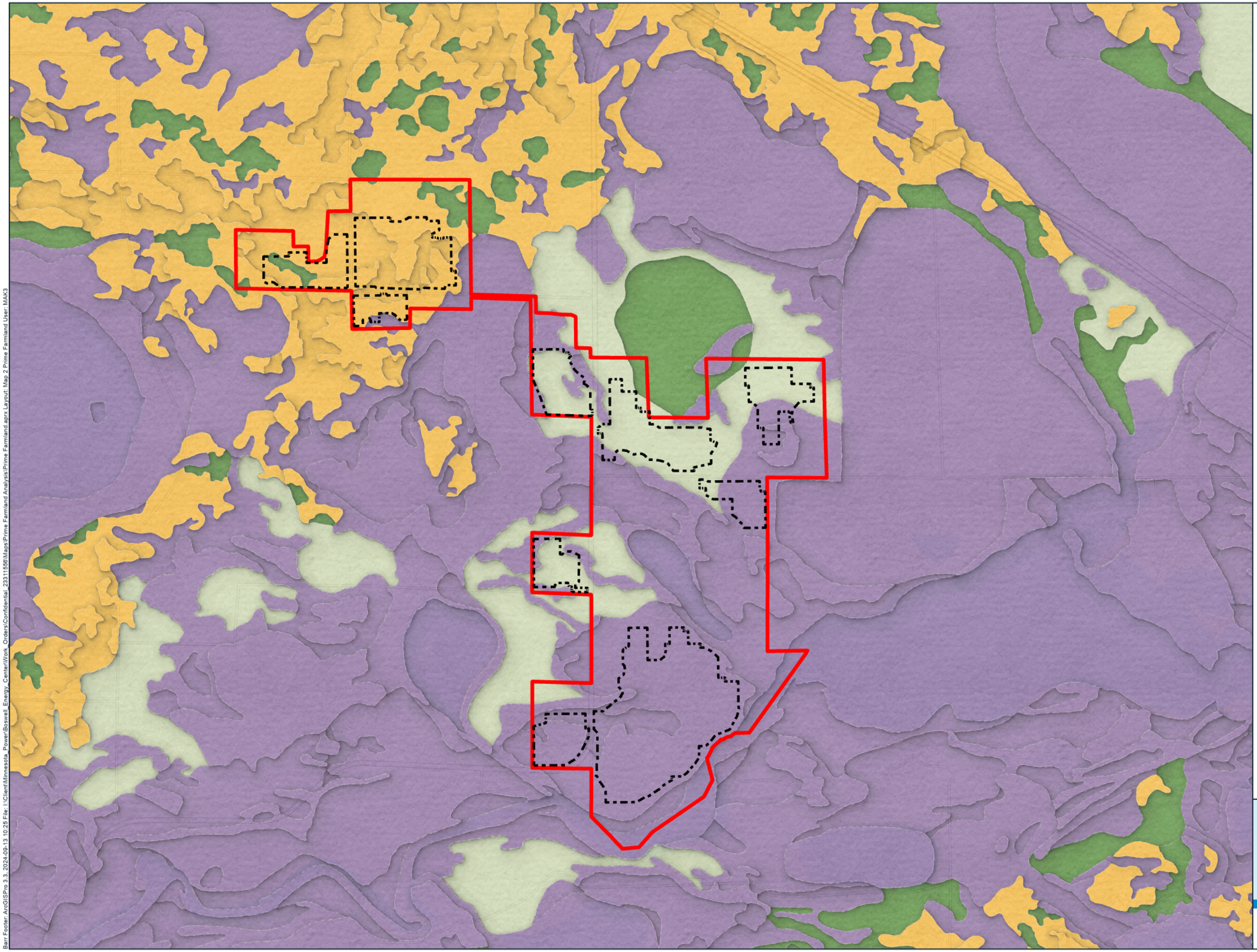

PRIME FARMLAND WITHIN PROJECT AREA
Prime Farmland Analysis
Minnesota Power

Map 2

BARR

T55 R270 S2
T55 R270 S1
T55 R260 S6
T55 R270 S11
T55 R270 S12
T55 R260 S7
T55 R270 S14
T55 R270 S13
T55 R260 S18

69-001-2200
69-001-2100
69-002-1100
69-002-1300
69-002-1400
69-001-2300
69-001-2400
69-001-3200
69-001-3100
69-001-4200
69-001-4103
69-001-4101
69-001-4402
69-012-4100
69-013-1101
69-013-1400
05-006-3300
05-006-4300
05-006-4400
05-007-2102
05-007-2200
05-007-2101
05-007-1200
05-007-1100
05-007-2300
05-007-2400
05-007-1300
05-007-3100
05-007-3200
05-007-4200
05-007-4300
05-007-3300
05-007-3400
05-018-2200
05-018-2100
05-018-1200
05-018-1301
05-018-2300
05-018-2400
05-018-3100
05-018-3200

234 COUNTY
251 COUNTY
249 COUNTY
269 COUNTY
267 COUNTY
257 COUNTY
2
2
6

Site
Parcels to be Leased by Minnesota Power
Parcels Owned by Minnesota Power
Itasca County Parcel Boundary
Section Boundary

I think the yellow shading should be removed from this Figure.

N

0 1,000 2,000
Feet

Imagery: 2023 Itasca County

PARCEL OWNERSHIP
Prime Farmland Analysis
Minnesota Power

Map 3

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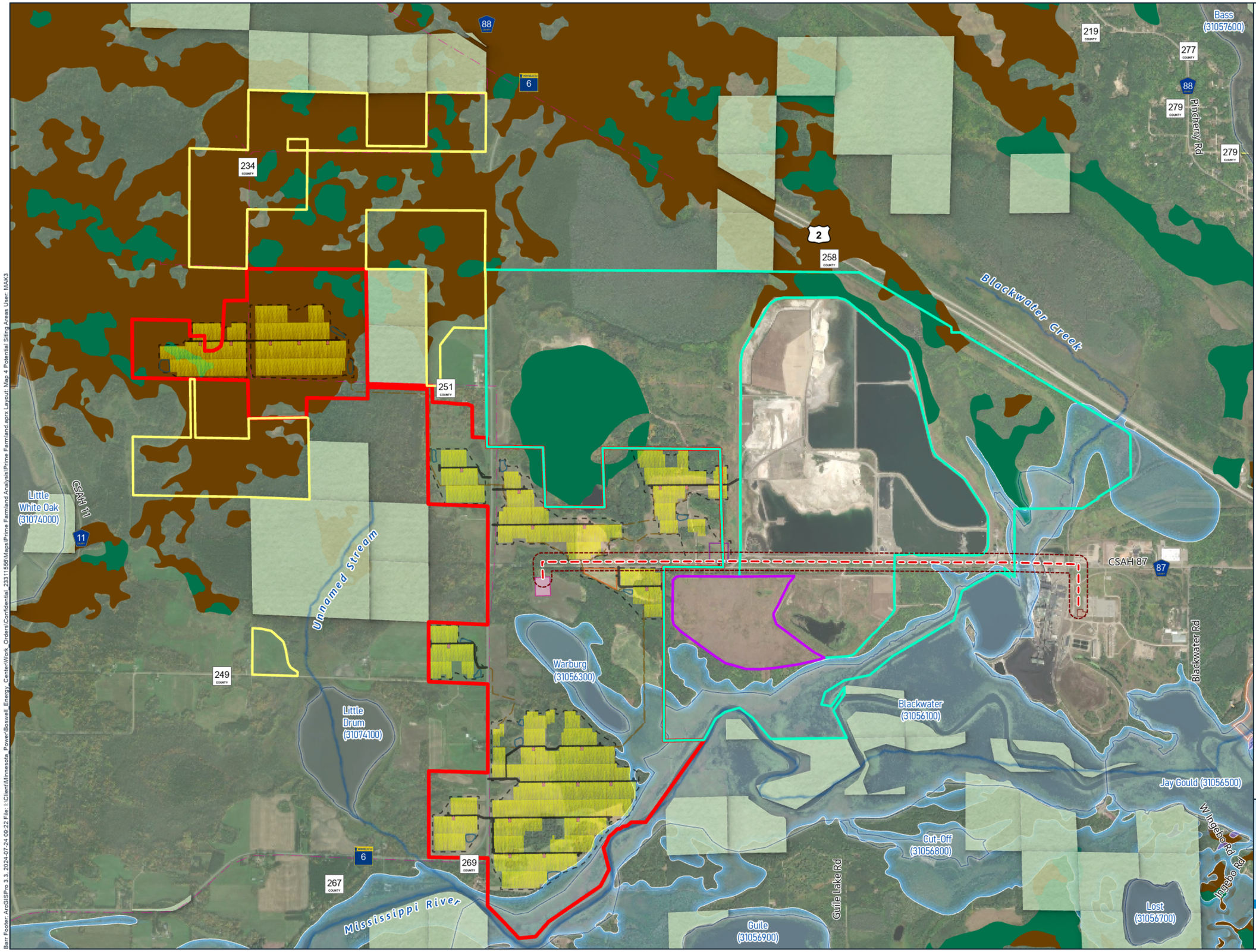

POTENTIAL SITING AREAS
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Map 4

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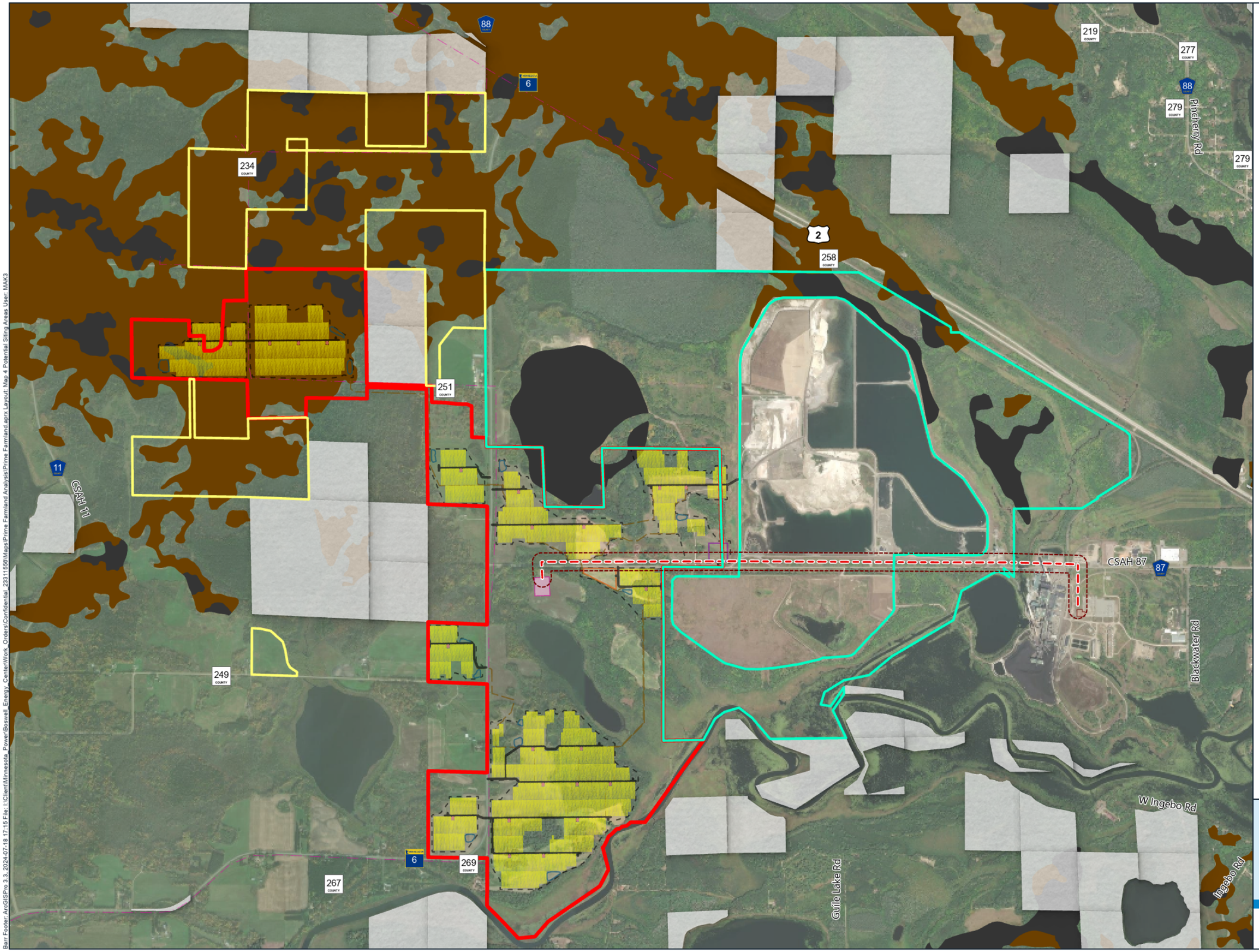

POTENTIAL SITING AREAS
Prime Farmland Analysis
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Map 4

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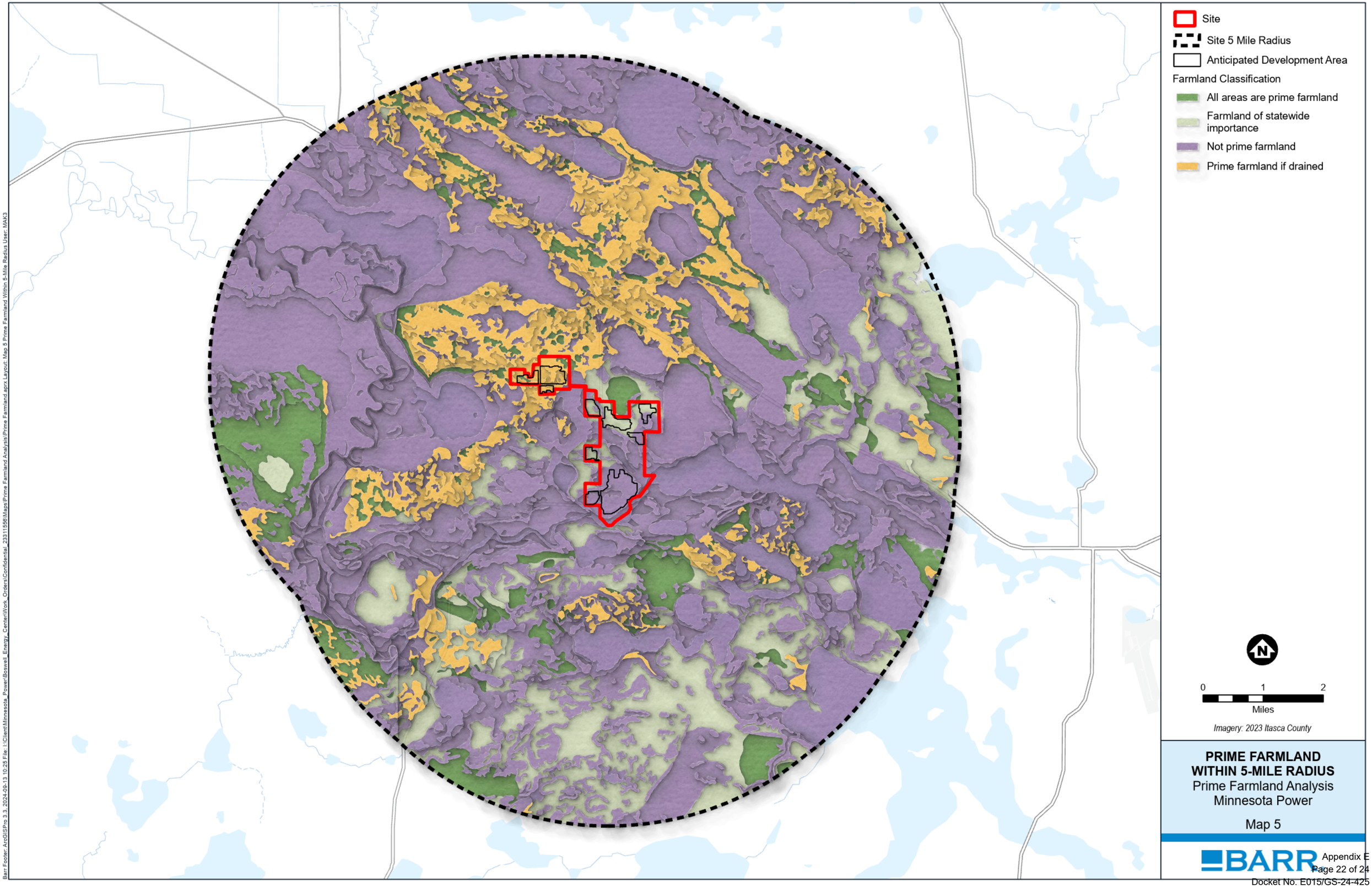

PRIME FARMLAND WITHIN 5-MILE RADIUS
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Map 5

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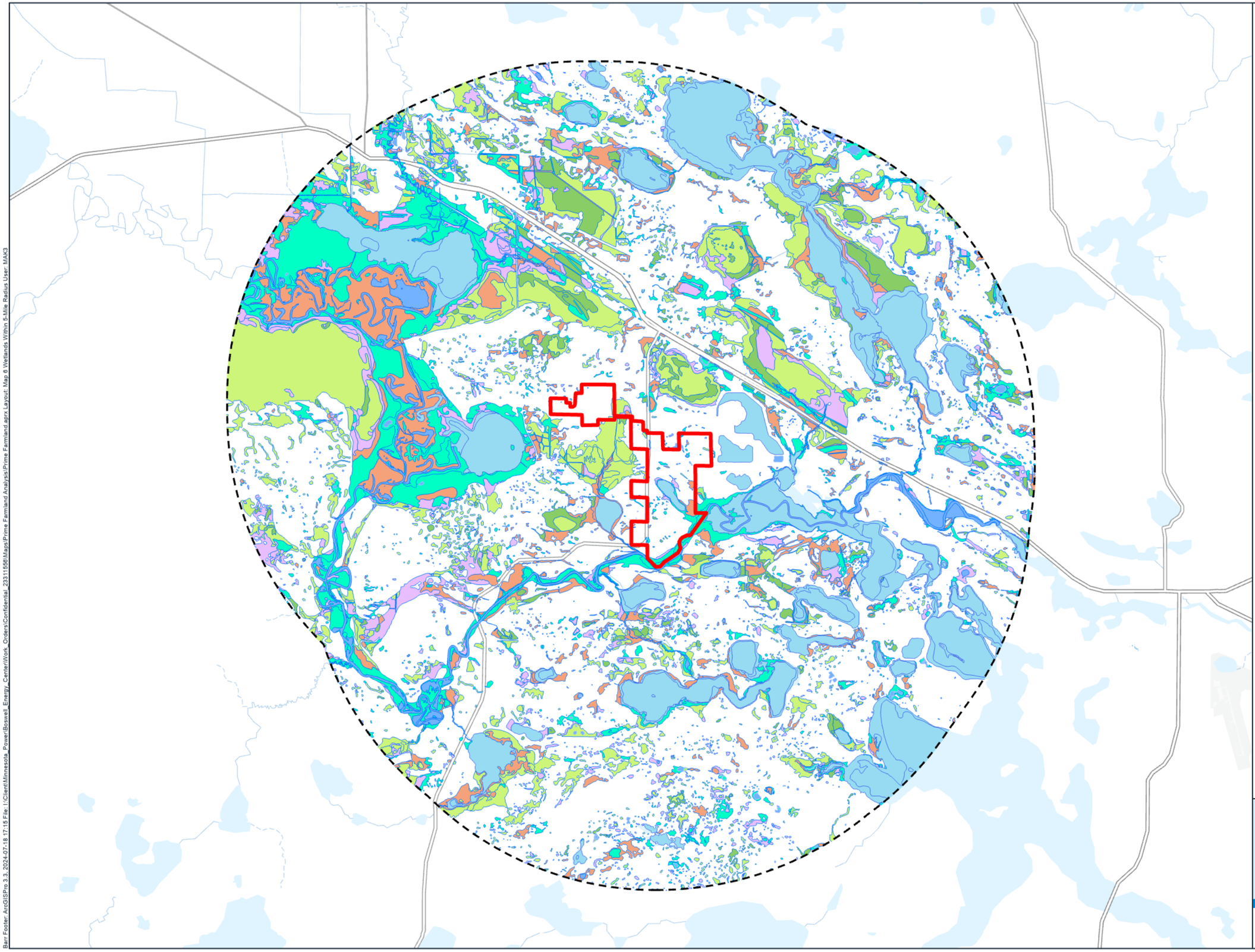

WETLANDS
WITHIN 5-MILE RADIUS
Prime Farmland Analysis
Minnesota Power

Map 6

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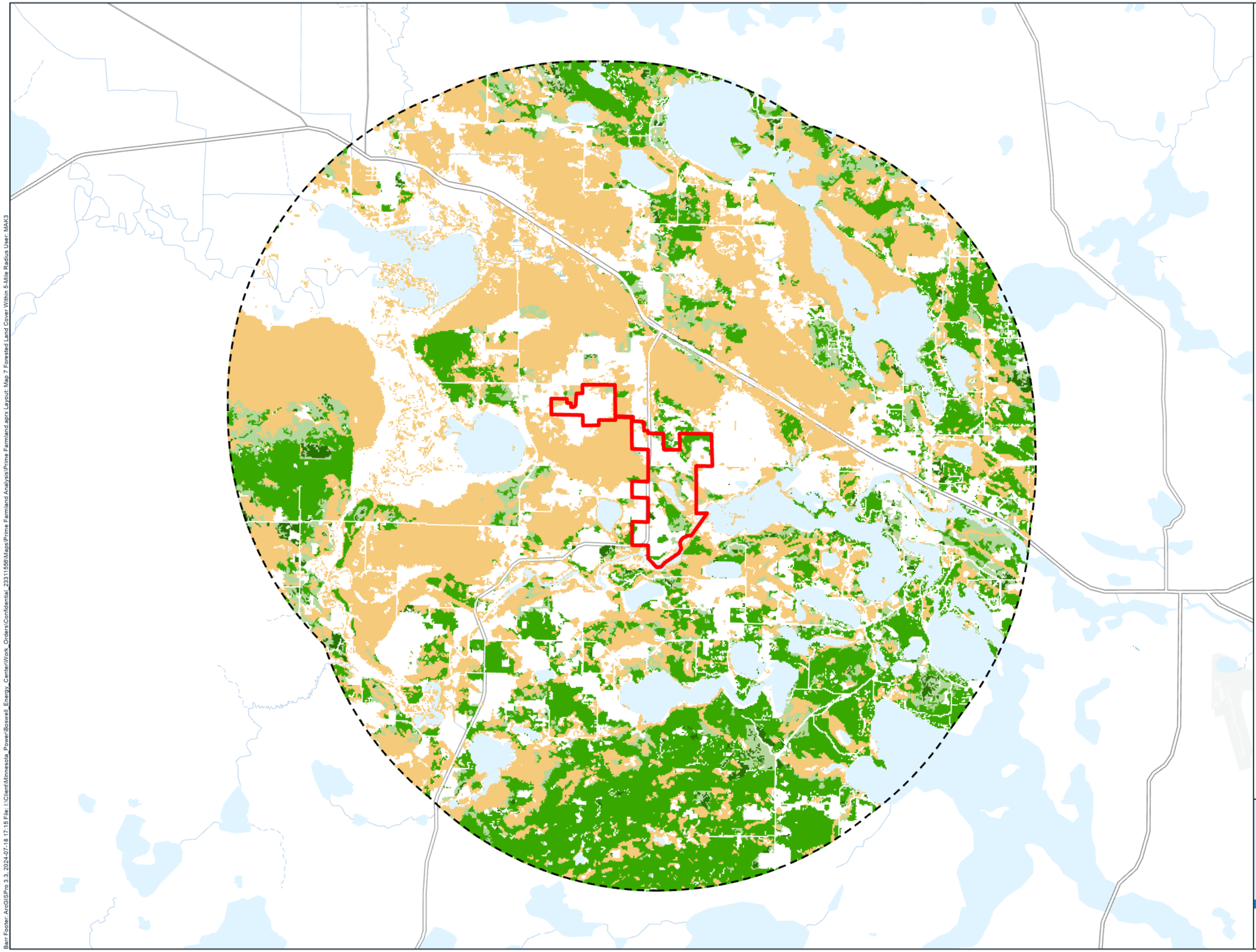

FORESTED LAND COVER WITHIN 5-MILE RADIUS
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Map 7

BARR