



Appendix E

Prime Farmland Analysis

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Birch Coulee Solar Project, Renville County, Minnesota



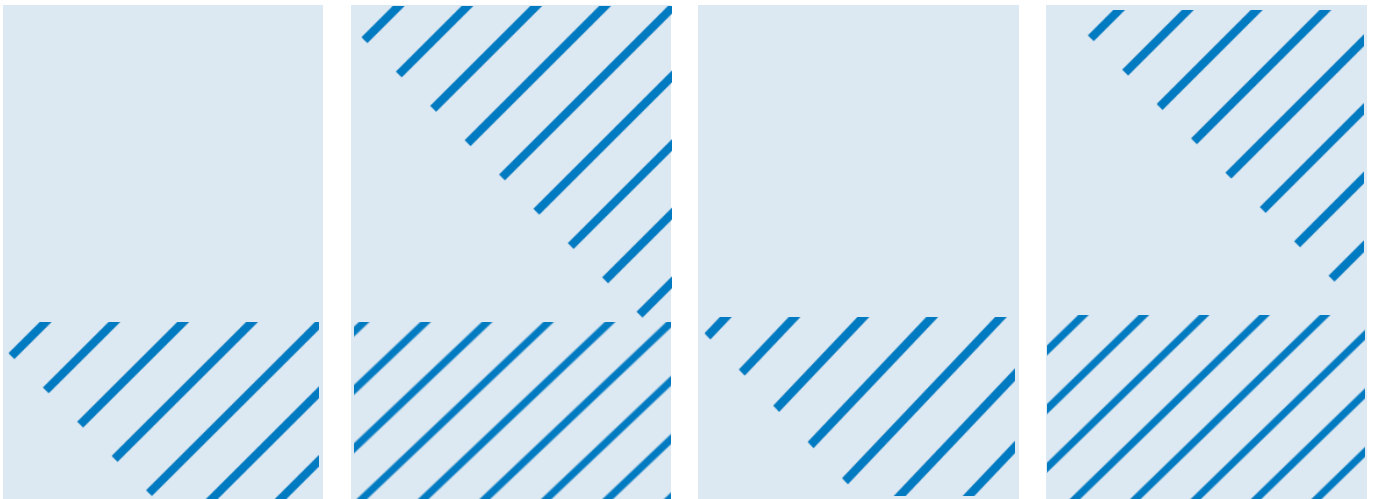
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Prime Farmland Analysis for Birch Coulee Solar Project

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1 Introduction

On behalf of and in coordination with Birch Coulee Solar LLC (Birch Coulee Solar), an affiliate of AES Clean Energy Development, LLC, 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 Birch Coulee Solar Project (Project) is a proposed up to 125-megawatt (MW) alternating current (MWac) solar project to be located in Camp, Birch Cooley, and Bandon Townships and city of Franklin, Renville County, Minnesota (Figure 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 permissible 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), Project description, and 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. It considers siting constraints (Figure 2) as well as total prime farmland near the Site (Figure 3) as well as an alternative point of interconnection previously considered (Figure 4). The assessment results show there are no feasible and prudent alternatives to the proposed Project location and therefore Birch Coulee Solar 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." *Id. at p.1.*

Specifically, Minnesota Rule 7850.4400, subpart 4, provides:

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 (emphasis added).*¹

The following assessment takes into account the above Rule, the Guidance, as well as 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 125 MWac photovoltaic (PV) solar energy generating facility on contiguous, privately-owned land referred to as the Site (Figure 1). The Project is primarily in Camp, Birch Coulee, and Bandon Townships, Renville County, Minnesota; approximately 8 percent (86 acres) of the Site is in Franklin, Minnesota.

The purpose of the Project is to generate an annual average of approximately 264,000 MW hour (MWh) of renewable energy over its anticipated 35-year life.

The Project will support the state's carbon-free standards (CFS), renewable energy standards (RES), and solar energy standards (SES) in Minn. Stat. § 216B.1691, subd. 2g, which requires Minnesota utilities to generate or procure sufficient electricity equivalent to 100% of their retail energy sales from carbon-free energy sources by 2040, as well as setting other interim renewable energy and solar energy targets. As such, the Project will support the state's growing demand for renewable energy and for utilities, independent power purchasers and corporations seeking to use renewable energy for business growth. In addition, the Project will diversify electricity sources, address environmental concerns, meet anticipated growth in electrification (e.g., vehicles, heating, etc.), and address CFS, RES, SES, and policy goals, as described above.

4 Factors Driving Choice of Region

4.1 Description of Solar Resources in the Proposed Region versus Otherwise Compliant Area

Birch Coulee Solar reviewed publicly available solar generation data for southwestern Minnesota to identify areas of high solar potential. According to data analyzed by Clean Power Research, southwestern Minnesota provides some of the highest levels of solar horizontal irradiance in the state to support photovoltaic solar installation in comparison to other areas of the state. Annual irradiance in Minnesota ranges from 1,300 kWh/m²/yr in northeast Minnesota to 1,500 kWh/m²/yr in southwest Minnesota according to the Solar Potential Analysis Report developed for the Minnesota Department of Commerce and the Minnesota Solar Pathways Project (reference (2)).

4.2 Determination of Available Interconnection Points

Birch Coulee Solar searched southwestern Minnesota for existing substations with available capacity to support the initially proposed MW solar development. Birch Coulee Solar's process for identifying a substation included analyzing previous queue filings, proposed interconnection improvements, and

¹ The 43-acre portion of the Project within the city limits of Franklin are not subject to this rule. It is, however, included in the total acreages provided throughout this assessment for the purposes of a conservative and holistic representation.

current technical specification of current interconnection infrastructure. This search was conducted in 2020 and identified five potential points of interconnection located in Renville, Wright, Stearns, Chippewa, and Kandiyohi counties.

Of the five potential points of interconnection considered, two included 115-kV substations, whereas the remaining substations were of a smaller size and therefore would not meet the purpose of the project. The two 115-kV substations are in Renville County (the existing Franklin 115-kV Substation to which the Project would interconnect) and Stearns County (the existing Wakefield 115-kV Substation). The existing Wakefield 115-kV Substation is approximately 65 miles northeast of the Project, south of Cold Springs (Figure 4).

4.3 Efforts to Investigate Developable Sites in Otherwise Compliant Areas

For purposes of comparison, prime farmland in proximity to the existing Wakefield 115-kV Substation's potential point of interconnection is considered as part of the efforts to investigate developable sites in otherwise compliant areas. A total of 37.3% of the area within a five-mile radius of the existing Wakefield 115-kV Substation (Figure 4) is designated prime farmland (Table 1). By comparison, a total of 75.6% of the area within a five-mile radius of the Project is designated prime farmland (Figure 3).

Table 1 Prime Farmland Acreages: Project vs Wakefield POI

Classification	Five-Mile Radius from the existing Wakefield 115-kV Substation (Ac)	Five-Mile Radius from the existing Wakefield 115-kV Substation (%)	Five-Mile Radius from Project Center (Ac)	Five-Mile Radius from Project Center (%)
All areas are prime farmland	14,314.3	28.5%	17,356.9	34.5%
Prime farmland if drained	4,412.8	8.8%	18,805.4	37.4%
Prime farmland if protected from flooding or not frequently flooded during the growing season	0	0%	1,836.3	3.7%
Farmland of statewide importance	15,255.5	30.4%	6,302.7	12.5%
Not prime farmland	16,282.3	32.4%	5,963.6	11.9%
TOTAL	50,264.8	100%	50,264.9	100%

The area surrounding the Wakefield 115-kV Substation was evaluated as a potential alternative site in another part of the state that would minimize the Project's impact to prime farmland. However, landowners were unwilling to participate in a utility-scale solar project within a mile of the Wakefield 115-kV Substation. Therefore, while it contains less prime farmland as a total percentage compared to the Project site, siting the project near the Wakefield 115-kV Substation is not a feasible alternative.

The existing Franklin 115-kV Substation was ultimately selected due to the identified available capacity at the substation sufficient to meet the Project needs and the willingness of the landowners to participate in the Project. As a result, Birch Coulee Solar submitted an interconnection request in 2021. Birch Coulee Solar selected the Site for its proximity to the POI, supportive participating landowners, and no competition with other potential renewable energy projects (i.e., available land not currently participating in other renewable energy projects).

5 Factors to Consider When Prime Farmland is Present

Birch Coulee Solar's main driver during the site selection process was the required length of the electrical transmission line within proximity to the existing Franklin 115-kV Substation. Longer transmission lines mean greater construction and permitting costs and greater impacts to sensitive environmental, cultural, and historical resources. Therefore, a short transmission line (less than five miles) was the primary goal during site selection. Transmission lines greater than five miles in length would not only introduce additional impacts to the Project but would also introduce additional costs with the potential to jeopardize the Project's economic feasibility. The second driver was the willingness of the landowners to support the Project.

Other factors considered included the area of cleared land, topography, slopes, surficial geology, land use, areas of sensitive environmental resources (e.g., wetlands, surface waters, and known protected species locations) and cultural and historical resources.

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

In immediate proximity of the Site, Birch Coulee also considered a variation of the project site boundary (Figure 1). For purposes of comparison, it is used throughout this analysis as the "Variation Site." In part, the Variation Site includes some parcels previously considered given their proximity to the existing Franklin 115-kV Substation but ultimately not all included in the Site given landowner willingness to participate.

Additional feasible and prudent sites were not considered beyond the Variation Site near the existing Franklin 115-kV Substation. Within a five-mile radius of the substation, sensitive environmental resources (e.g., the Minnesota River and its floodplain) and prohibited areas (Section 5.2) are prevalent directly south of the Project (Figure 2). Additionally, land features that present constructability constraints such as shallow bedrock and steep slopes are also present directly south of the Project (Figure 2). These areas coincide with where areas of non-prime farmland are present. As such, additional sites to avoid prime farmland were not considered.

The proposed 125 MW Project will require approximately 1,041.6 acres of land for solar development. According to Minnesota Rule 7850.4400, Subpart 4, no more than 62.5 acres (125 MW x 0.5 acres) of prime farmland can be used for this Project without demonstrating that no feasible or prudent alternative exists or seeking a Rule variance.

Table 2 summarizes total acreages of prime farmland within the Site, the Variation Site, and Renville County. Approximately 89.9% of the Site is designated prime farmland. Similarly, 89.7% of the Variation Site is designated prime farmland. Approximately 90.9% of land within Renville County is prime farmland.

Table 2 Prime Farmland Acreages: County, Project, Five-Mile Radius and Alternative Site

Classification	Birch Coulee Site (Ac)	Birch Coulee Site (%)	Variation Site (Ac)	Variation Site (%)	Renville Co. (Ac)	Renville Co. (%)
All areas are prime farmland	356.2	34.2%	292.4	41.6%	218,754.3	34.6%
Prime farmland if drained	580.7	55.8%	338.1	48.1%	343,502.3	54.4%
Prime farmland if protected from flooding or not frequently flooded during the growing season	0	0.0%	0	0.0%	11,696.2	1.9%
Farmland of statewide importance	104.7	10.1%	72.0	10.3%	30,929.8	4.9%
Not prime farmland	0	0.0%	0	0.0%	26,610.5	4.2%
TOTALS	1,041.6	100%	702.5	100%	631,493.1	100%

Ultimately, the Site was selected due to its proximity to the existing Franklin 115-kV Substation (less than 0.10 mile) and the landowners' willingness to participate in the Project. In addition, the area includes flat terrain; cleared, undeveloped land; few landowners; and a low risk of impact to environmental, cultural, and historical resources.

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. The Cedar Mountain State Scientific and Natural Area (Figure 2) and a stretch of the Minnesota River south of Franklin were specifically avoided due to their prohibited status.

5.3 Good Faith Consideration of Alternative Site Configurations or Technologies

Locating the Site several miles from the interconnect site, which would require using a longer transmission line, was not a feasible or prudent option for this Project. A longer transmission line would have meant greater environmental impacts (e.g., wetland, surface water, protected species habitat, and floodplain impacts) and potentially greater cultural and historical resource impacts. Therefore, establishing a longer transmission route was not considered feasible or prudent for this Project.

Opportunities for the use of alternative technologies was considered but ultimately not considered a feasible or prudent option for this Project. For example, using panel/rack designs that allow for siting on steeper slopes was not feasible given that the 5-mile area surrounding the interconnect site primarily consists of flat farmland except for the areas that are not suitable for the reasons stated throughout this analysis.

5.4 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."

The below-listed items, while not an exhaustive list, represent Project mitigative measures and offsetting benefits for the prime farmland and future use of the land for agricultural purposes at the end of the Project's useful life.

- As part of the Application, Birch Coulee Solar 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 Project lands to return to agricultural production upon Project decommissioning.
- Through implementation of the VMP, Birch Coulee Solar will establish native perennial vegetation that is compatible with Project operations and maintenance needs, while improving the soils and benefiting native pollinators. Birch Coulee Solar intends to meet Minnesota's Habitat Friendly Solar Standard, described in Minn. Stat. Sec. 216B.1642 and meet the requirements set forth by the Minnesota Board of Water and Soil Resources (BWSR) in its pollinator guidance documents. Increased pollinator habitat may help offset declines in insect populations through habitat restoration and enhancement in agricultural landscapes.
- As noted in the Application, corn and soybeans represent the dominant crops in the Site and have been for the past ten years. A recent study on insect community responses to habitat establishment at solar energy facilities in Minnesota found increases over time for habitat and biodiversity metrics as well as positive effects of proximity to solar-pollinator habitat on bee visitation to nearby soybean fields. Bee visitation to soybean flowers adjacent to solar-pollinator habitat were comparable to bee visitation to soybeans adjacent to grassland areas enrolled in the Conservation Reserve Program, and greater than bee visitation to soybean field interior and roadside soybean flowers (reference (3)).
- Also as noted in the application, a Wellhead Protection Area and Drinking Water Supply Management Area (DWSMA) are within the southern portion of the Site. The DWSMA vulnerability is designated as very low. Birch Coulee Solar will restore the area with perennial vegetation, which allows for water to filter into the soil for treatment. This is anticipated to provide a stackable benefit of protecting part of the groundwater source from nitrates commonly used in agricultural practices.

6 Conclusions

Birch Coulee Solar concludes that no feasible and prudent alternative to the proposed Project area exists, and therefore, an exception to Minnesota Rule 7850.4400, Subpart 4 is warranted. As outlined above, the primary reasons supporting this conclusion are as follows:

- availability of adequate solar resources driving the choice of region,
- limited availability of interconnection points with capacity within the selected region,
- prevalence of prime farmland in region generally and surrounding the selected interconnection site specifically,
- need to minimize length of transmission line to reduce impacts to environmental, cultural, and historical resources and to support economic viability of the project;
- landowner willingness to participate in the Project, and
- site constraints including prohibited sites and sensitive resources.

7 References

1. **Commerce, Minnesota Department of.** Solar Energy Production and Prime Farmland Guidance for Evaluating Prudent and Feasible Alternatives. [Online] May 2020.
2. **Research, Clean Power.** Solar Potential Analysis Report Prepared for Minnesota Department of Commerce and the Minnesota Solar Pathways Project . [Online] 2018. <https://mn.gov/commerce-stat/pdfs/solar-potential-analysis-report.pdf>.
3. *If you build it, will they come? Insect community responses to habitat establishment at solar energy facilities in Minnesota, USA.* **Leroy Walston, Heidi Hartmann, Laura Fox, Jordan Macknick, James McCall, Jake Janski, and Lauren Jenkins.** Environmental Research Letters, s.l. : IOP Publishing, 18 December 2023.



Figures

