Combined Environmental Assessment and Environmental Report: Louise Solar Project

Human and Environmental Impacts of Constructing and Operating the 50 MW Louise Solar Project

September 27, 2021

COMMERCE DEPARTMENT

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Sources

Much of the information used to prepare this environmental assessment comes from the certificate of need and site permit applications. Additional sources include information from relevant federal and state environmental review documents for similar projects, spatial data and site visits.

Project Mailing List

To place your name on the project mailing list contact docketing.puc@state.mn.us or (651) 201-2204 and provide the docket number (20-646 or 20-647), your name, email address, and mailing address. Please indicate whether you would like to receive notices by email or U.S. mail.

Alternative Formats

This document can be made available in alternative formats, that is, large print or audio, by calling (651) 539-1530 (voice).

Acronyms and Abbreviations

AC	alternating current
ALJ	administrative law judge
applicant	Louise Solar, LLC
BWSR	Board of Water and Soil Resources
commerce	Department of Commerce
CN	Certificate of Need
commission	Public Utilities Commission
CSW Permit	Construction Stormwater Permit
dBA	A-weighted sound level recorded in units of decibels
DC	direct current
DNR	Department of Natural Resources
EA	environmental assessment
ECE	East Central Energy
EERA	Energy Environmental Review and Analysis
ELF-EMF	extremely low frequency electromagnetic fields
EMF	electromagnetic fields
ER	environmental report
GRE	Great River Energy
kV	kilovolt
MBS	Minnesota Biological Survey
MDA	Department of Agriculture
MP	Minnesota Power
MW	megawatt
/MWh	per megawatt hour
Minn. R.	Minnesota Rule
Minn. Stat.	Minnesota Statute
mG	milligauss
MnDOT	Department of Transportation
MPCA	Pollution Control Agency
NAC	noise area classification
NHIS	Natural Heritage Information System
NLCD	National Land Cover Database
project	Louise Solar Project
PV	photovoltaic
RES	renewable energy standard
ROI	region of influence
sample permit	sample solar site permit
SCADA	supervisory control and data acquisition
SES	solar energy standard
SGCN	Species in Greatest Conservation Need
SHPO	State Historic Preservation Office
SSURGO	Soil Survey Geographic Database
Two Rivers	Two Rivers Campground and Tubing
USACE	U.S. Army Corps of Engineers

USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WCA	Wetland Conservation Act

Definitions

Several terms used in this document have specific meaning in Minnesota law or regulation. Other terms are defined for clarity.

associated facilities means buildings, equipment, and other physical structures that are necessary to the operation of a large electric power generating plant or high voltage transmission line (Minnesota Rule 7850.1000, subpart 3).

collection line means an above-ground double-circuit three-phase 34.5 kV distribution line proposed by the applicant to connect the solar array to the project substation.

collection line corridor means the review area for the collection line, project substation, and gen-tie transmission line.

construction means any clearing of land, excavation, or other action that would adversely affect the natural environment of the site or route but does not include changes needed for temporary use of sites or routes for nonutility purposes, or uses in securing survey or geological data, including necessary borings to ascertain foundation conditions (Minnesota Statute 216E.01, subdivision 3).

distribution line means power lines that operate below 69 kilovolts.

gen-tie transmission line means the high voltage transmission line proposed by the applicant to connect the project substation to the switching station.

high voltage transmission line means a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length (Minnesota Statute 216E.01, subdivision 4).

land control area means the review area for the solar array.

large electric power generating plant means electric power generating equipment and associated facilities designed for or capable of operation at a capacity of 50,000 kilowatts or more (Minnesota Statute 216E.01, subdivision 5).

large energy facility means any electric power generating plant or combination of plants at a single site with a combined capacity of 50,000 kilowatts or more and transmission lines directly associated with the plant that are necessary to interconnect the plant to the transmission system (Minnesota Statute 216B.2421, subdivision 2(1)).

local vicinity means 1,600 feet from the land control area and collection line corridor.

mitigation means to avoid, minimize, correct, or compensate for a potential impact.

power line means a distribution, transmission, or high voltage transmission line.

project area means one mile from the land control area and collection line corridor.

solar farm means ground-mounted photovoltaic equipment capable of operation at 50,000 kilowatts or more connected directly to the electrical grid.

solar energy generation system means a set of devices whose primary purpose is to produce electricity by means of any combination of collecting, transferring, or converting solar-generated energy (Minnesota Statute 216E.01, subdivision 9a).

transmission line means power lines that operate at 69 kilovolts and above.

Summary

Louise Solar Project, LLC (applicant), a wholly owned subsidiary of EDF Renewables, Inc., must obtain a certificate of need and site permit from the Minnesota Public Utilities Commission (commission) before it can construct the proposed Louise Solar Project (project). The project would interconnect to the electrical grid at the existing Adams substation owned by ITC Midwest.

The applicant filed separate certificate of need (CN) and site permit applications on February 11, 2021. The site application was found to be substantially complete by the Commission on May 7, 2021.

What is an Environmental Assessment?

This document is an environmental assessment. The commission will use the information in this document to inform their decisions about issuing a CN and permits for the project.

This environmental assessment ("EA") contains an overview of affected resources and discusses potential human and environmental impacts and mitigation measures. Energy Environmental Review and Analysis staff within the Commerce Department ("commerce") prepare this document as part of the environmental review process. Scoping is the first step in the process. It provides opportunities to provide comments on the content of this environmental assessment, suggest alternatives, and to mitigate potential impacts.

Where do I get more information?

For additional information contact PUC or commerce staff.

If you would like more information or if you have questions, please contact commerce staff: Jamie MacAlister (jamie.macalister@state.mn.us),(651) 539-1775 or the public advisor: Mike Kaluzniak (publicadvisor.puc@state.mn.us, (651) 201-2257.

The certificate of need and site permit applications, can be found on eDockets: https://www.edockets.state.mn.us/EFiling/search.jsp by searching "20" for year and either "646" (certificate of need) or "647" (site permit) for number. Information is also available on the commerce webpage: https://apps.commerce.state.mn.us/eera/web/project/14235 .

What is the applicant proposing to construct?

A 50-megawatt solar energy generating system and associated facilities.

The project's primary components include solar panels affixed to a linear ground-mounted single-axis tracking system, inverters and transformers housed in electrical cabinets, electrical collection system, collection line, project substation, and supervisory control and data acquisition ("SCADA") systems and metering equipment. It also requires fencing, access roads, laydown areas, weather stations, and an operation and maintenance facility. The project would interconnect to the electrical grid at an existing substation through a new 161 kV overhead gen-tie transmission line approximately 700-1,000 feet long.

What is the project's purpose?

To increase solar generating capacity in Minnesota.

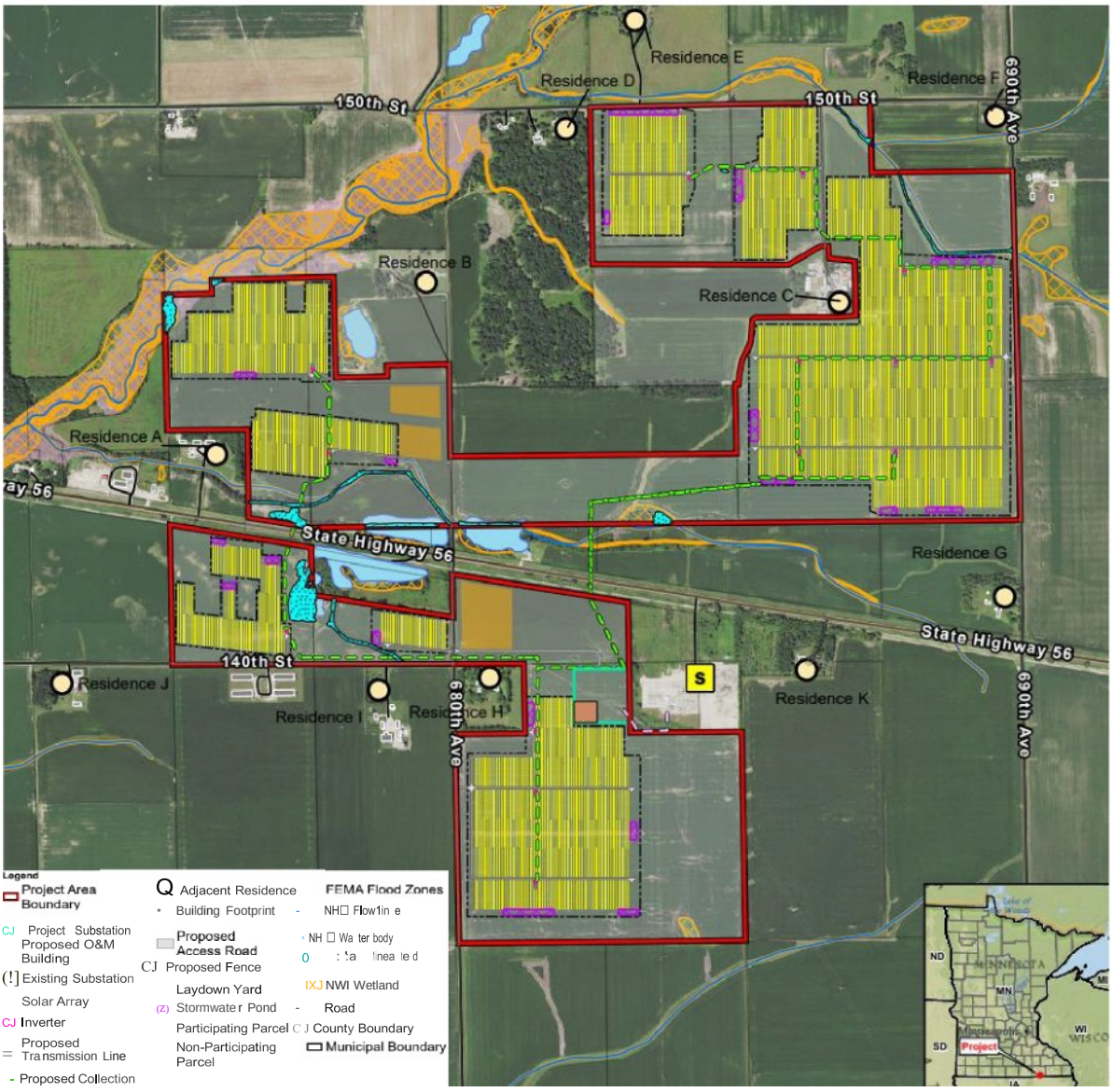
The applicant indicates the project will "meet the growing commercial and industrial customer (C&I) demand for additional renewable energy resources, to accommodate the Solar Energy Standard set forth in Minnesota Statutes and to meet other clean energy requirements in Minnesota and neighboring states." The applicant has not secured a power purchase agreement at this time.

Where is the project located?

The project is located in Lodi and Adams Townships in Mower County, Minnesota.

The Project is located in a rural area approximately one mile east of Adams and 1.3 miles west of Taopi, Minnesota. Of the 613 acres leased by the applicant, 325 acres will be used for the project.

Map 1 Project Location



What permits are needed?

A certificate of need and site permit from the commission are required. Federal, state, and local permits may also be necessary to construct the project.

The project requires a certificate of need from the commission because it meets the definition of *large energy facility* in Minnesota statute, which is any electric power generating plant with a capacity of 50 megawatts ("MW") or more.

The project also requires a site permit from the commission because it meets the definition of *large electric power generating plant* in Minnesota statute, which is any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more.

The gen-tie line is an associated facility and is permitted as part of the project and is analyzed in this EA.

Various federal, state, and local approvals will be required for activities related to the construction and operation of the project. These permits are referred to as "downstream permits" and must be obtained by the applicant prior to constructing the project.

What are the potential impacts of the project?

The project will impact human and environmental resources. Impacts will occur during construction and operation.

A potential impact is the anticipated change to an existing condition caused directly or indirectly by the project. Potential impacts can be positive or negative, short- or long-term, and can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations. The impacts of constructing and operating a project can be mitigated by avoiding, minimizing, or compensating for the adverse effects and environmental impacts of a project.

The context of an impact—in combination with its anticipated on-the-ground effect and mitigation measures—is used to determine an impact intensity level, which can range from highly beneficial to highly harmful. Impacts are grouped: archeological and historic resources, human settlement, human health and safety, public services, land-based economies, and natural resources.

Select resource topics received abbreviated study because they were deemed to be of minor importance to the commission's site permit decision. Potential impacts are anticipated to be negligible to airports, displacement, electronic interference, emergency services, floodplains, forestry, geology, implantable medical devices, stray voltage, topography, and wetlands.

Human Settlement

Large energy projects can impact human settlement. Impacts range from short-term, such as increased local expenditures during construction, to long-term, such as changes to viewsheds.

Aesthetics

The impact intensity level is expected to be minimal. Locations where visual impacts may potentially be the greatest are adjacent to residences and along public roadways and trails. The solar arrays will

be visible from adjacent roadways, parcels and state trail. The 700-1,000-foot transmission line will be visible from a greater distance than the panels, but the change is likely to be negligible given its short length and proximity to the Adams Substation and other existing transmission lines.

Cultural Values

The impact intensity level is anticipated to be minimal. The project is not anticipated to impact or alter the work and leisure pursuits of residents in such a way as to impact the underlying culture of the area. Differences between cultural values related to renewable energy and rural character has the potential to create tradeoffs that cannot be addressed in the site permit.

Land Use and Zoning

The impact intensity level is anticipated to be minimal. Potential impacts to zoning are anticipated to be long-term and localized. Constructing the project will change land use from agricultural to solar energy production for at least 30 years. After the project's useful life, the project area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized. The Solar Project will change the land use from agricultural to solar energy use within the Preliminary Development Area (Map 1). The conversion of agricultural land to the solar facility will have a relatively minimal impact on the rural character of the surrounding area or Mower County. As discussed further in Section 4.3, Land-based Economies, of the 455,680 acres in Mower County the majority is classified as agricultural land. Impacts to 325 or less acres of agricultural land within the solar facility and transmission line footprint would reduce the amount of agricultural land in the county by less than one percent.

Noise

Specific impacts are associated with construction and operation. The impact intensity level during construction is anticipated to range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts will affect unique resources (residences, campground), and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be negligible. Construction noise will be temporary in duration, limited to daytime hours and relatively minimal, and will return to background levels of 40 dBA during the day and 34 dBA at night once construction is finalized. Construction associated noise will likely be perceptible at adjacent residences although none are located within the Project Area. Noise will be generated from construction equipment

Property Values Impacts to property values within the local vicinity could occur; however, changes to a specific property's value are difficult to determine. On whole, impacts in the local vicinity are anticipated to be minimal and dissipate at distance. Impacts to specific properties could be moderate to significant. Long-term impacts might or might not occur. Potential impacts can be minimized.

Recreation

During construction the impact intensity level is anticipated to be moderate to significant. Potential impacts will be intermittent and occur over the short-term. These localized impacts will affect a unique resource. Impacts can be minimized or avoided. Operational impacts will be long-term, unavoidable, and subjective to the individual. Construction and operation of the Project is not anticipated to impact recreational opportunities near the Project Area. Use of the Shooting Star State Trail could be interrupted for short periods while deliveries are made to the southern portion of the site at the intersection of Highway 56 and 680$_{th}$ Avenue, but these are anticipated to be temporary and short in duration.

Socioeconomics

The impact intensity level is anticipated to be minimal to significant and positive. Effects associated with construction will, overall, be short-term and minimal. Significant positive effects might occur for individuals. Impacts from operation will be long-term and significant. Adverse impacts are not anticipated. Adverse impact to socioeconomics will be limited to the temporary loss of the agricultural production on the land currently farmed. However, these temporary losses are negated by the payments to the landowners from the Project.

Human Health and Safety

Large energy projects have potential to impact human health and safety.

Electronic and Magnetic Fields

The impact intensity level is anticipated to be negligible and are not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized.

Public Safety

The impact intensity level is minimal. Potential impacts would be short-and long-term and can be minimized. Public safety concerns would be most associated with unauthorized entry to the project.

Public Services

Large energy projects can impact public services, such as buried utilities or roads. These impacts are usually temporary, for example, road congestion associated with material deliveries. Impacts can be long-term if they change the area in a way that precludes or limits public services.

Roads and Highways

Potential impacts associated with construction are anticipated to be short-term, intermittent, and localized. The impact intensity level is expected to be minimal to moderate. During operation, no impacts to roads are anticipated; negligible traffic increases would occur for maintenance. Impacts are unavoidable but can be minimized. During the construction phase, temporary impacts are anticipated on some public roads within the vicinity of Project, primarily through additional traffic and the potential for slow-moving construction vehicles.

Utilities

The impact intensity level is anticipated to be minimal. Impacts should be limited to a single electrical outage. Potential impacts can be minimized. Limited, temporary impacts to service may occur during interconnection of the Solar Project Substation via the short 161kV transmission line to the Adams Substation, but these outages are anticipated to be of short duration and closely coordinated with utilities and landowners.

Land-based Economies

Large energy projects can impact land-based economies by limiting land use for other purposes.

Agriculture The impact intensity level is anticipated to be significant. activities with the greatest potential to affect topsoil conditions is likely to be grading for the solar arrays, construction of access roads, and the Solar Project Substation. Minor impacts will be associated with installation of several transmission power poles. Potential impacts are localized and unavoidable but can be minimized.

Archeological and Historic Resources

The impact intensity level is anticipated to be negligible to minimal. Impacts, should they occur, will be localized, and affect a unique resource. Impacts can be mitigated through prudent routing of the project's collection line.

No previously recorded archaeological or historic sites will be directly impacted by the proposed Project. A Phase I archaeological survey of the Project Area, including the short transmission line route, was completed in October 2020, and no archaeological sites were identified.

Natural Resources

Large energy projects can impact the natural environment. Impacts are dependent upon many factors, such as how the project is designed, constructed, maintained, and decommissioned. Other factors, such as the environmental setting, influence potential impacts. Impacts vary significantly within and across projects.

Air Quality The impact intensity level is anticipated to be minimal. Intermittent localized impacts will occur during construction. Once operational, the solar array will not generate criteria pollutants or carbon dioxide. Impacts related to operation of the collection line are anticipated to be long-term, localized, and negligible. Impacts are unavoidable and do not affect a unique resource.

Groundwater The impact intensity level is anticipated to be minimal. Any localized impacts would be intermittent but have the potential to occur over the long-term. Impacts can be mitigated. The Solar Project disturbances are generally anticipated to be limited to the ground surface and upper soil column. It is anticipated that there will be minimal contact with the surficial water table, and no contact with deeper groundwater or aquifers. Wells identified within the Solar Project boundary will likely be capped and abandoned in place according to applicable regulation.

Rare and Unique Resources No impacts to rare and unique resources are anticipated.

Soils The impact intensity level is expected to be moderate to minimal. Impacts to soils will occur during both the construction and operational stages of the Project. Grading impacts will primarily be associated with the construction of foundations for the substation, access roads, and spot grading for the solar arrays and inverter skids. Impacts to soils will also occur associated with transmission pole installation for the associated transmission line.

Surface Water The impact intensity level is anticipated to be minimal. Direct impacts to surface waters are not expected. Indirect impacts to surface waters may occur. These impacts will be short-term, of a small size, and localized.

Wildlife and Habitat Potential impacts can be positive or negative and are species dependent. Long-term, minimal positive impacts to birds, small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur to individuals during construction and operation of the project. Once restored, the land control area will provide native grassland habitat for the life of the project. The project does not contribute to significant habitat loss or degradation or create new habitat edge effects. Potential impacts can be mitigated in part. The impact intensity level is expected to be minimal.

What's next?

A public hearing will be held in the project area; you can provide comments at the hearing. The commission will then review the record and decide whether to grant a certificate of need and issue a site permit.

An administrative law judge ("ALJ") from the Office of Administrative Hearings will hold a public hearing after the EA is complete and available. At the hearing you may ask questions and submit comments about the project. After the close of the comment period, the ALJ will provide a written report to the commission summarizing the public hearing and any comments received. The ALJ will also provide the commission with proposed findings and a recommendation whether to issue a certificate of need and site permit.

The commission reviews all of the information in the project record in determining whether to grant a certificate of need and issue a site permit. If the commission issues a certificate and site permit for the project, it may identify measures to mitigate potential impacts. The commission is expected to make a decision in early 2022.

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Chapter 1: Introduction

The Commerce Department ("commerce") prepared this environmental assessment ("EA") for the proposed Louise Solar Project ("project")—a 50 megawatt ("MW")[1] solar energy generating system and associated facilities to be located in Mower County, Minnesota (is needed to "meet the growing commercial and industrial customer (C&I) demand for additional renewable energy resources, to accommodate the Solar Energy Standard set forth in Minnesota Statutes and to meet other clean energy requirements in Minnesota and neighboring states. The Project will provide cost-effective solar energy and help meet the Minnesota Renewable Energy Objectives (Minnesota Statutes §216B.1691)."). The project is proposed by Louise Solar Project, LLC, ("applicant") a wholly owned subsidiary of EDF Renewables.[2]

Under the Power Plant Siting Act, the Minnesota Public Utilities Commission (Commission) is charged with making sure that large electric power facilities are sited in a manner that minimizes adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and fulfillment of electric energy needs in an orderly and timely fashion.[3] For HVTLs, the Commission fulfills this charge through their route permitting process. In the route permitting process, proposers of HVTLs file a route permit application with the Commission; the Commission conducts a review of human and environmental impacts with assistance from the Minnesota Department of Commerce (Commerce) Energy Environmental Review and Analysis (EERA) and then makes a permit decision. The permit decision defines the route for the project and appropriate mitigation measures.

The purpose of the EA is to inform the public and decision makers of the potential impacts of the proposed project, alternatives under consideration, and how impacts of the project and alternatives can be mitigated. This EA only studies the proposed project. No alternative sites or routes were proposed for study during the scoping period and EERA did not identify any reasonable alternatives to the proposed project. Without alternatives, the primary permitting decision before the Commission is what conditions to include in the site permit to mitigate human and environmental impacts.

The EA provides a discussion of the resources affected by the project and discusses potential human and environmental impacts[4] and mitigation measures. It also studies alternatives to the project itself. An EA is an information document. It is intended to facilitate informed decisions by the Public Utilities Commission ("commission"), particularly with respect to the goals of the Minnesota Power Plant Siting Act to "minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity and insuring that electric energy needs are met and fulfilled in an orderly and timely fashion".[5]

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1 *See generally* Minnesota Statute 216E.021 (the applicant submitted a solar size determination form for the project).

2 Louise Solar, LLC (February 11, 2021) *Louise Solar Site Permit Application*, eDockets No.

3 Minnesota Statutes (Minn. Stat.) 216E.02

4 In this document, the terms "effect" and "impact" are synonymous and could be beneficial or detrimental.

5 Minn. Stat. 216E.02, subd. 1.

What is the state of Minnesota's role?

The applicant needs two approvals from the Public Utilities Commission. Commerce prepared this EA. An administrative law judge will oversee a public hearing.

To build the project, the applicant needs two approvals—a certificate of need and site permit—from the commission. In addition, the project might require additional approvals from other federal and state agencies and local governments, for example, a License to Cross from the Department of Natural Resources ("DNR"). A site permit supersedes local zoning, building, and land use rules.[6] The commission's site permit decision must be guided, in part, however, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts".[7]

The applicant applied to the commission for a certificate of need and a site permit for the project in February 2021.[8,9] With these applications, the commission has before it two distinct considerations:

- Is the project needed? Or would another project be more appropriate for the state of Minnesota, for example, a project of a different type or size, or a project that is not needed until further into the future?
- If the project is needed, where is it best located[10] and what conditions should be placed on the site permit?

To ensure a fair and robust airing of the issues, the Minnesota Legislature set out a process for the commission to follow when considering certificate of need and site permit applications.[11] In this instance, an EA was prepared and a public hearing will be held. The goal of the EA is to describe potential human and environmental impacts of the project (*the facts*), whereas the intent of the public hearing is to allow interested persons the opportunity to advocate, question, and debate what the commission should decide about the project (*what the facts mean*). The record developed during this process—including all public input—will be considered by the commission when it makes its decisions on the applicant's certificate of need and site permit applications.

How is this document organized?

The EA addresses the matters identified in the scoping decision.

This EA is based on the applicant's certificate of need and site permit applications and public scoping comments. It addresses the matters identified in the June 22, 2021 scoping decision.[12]

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[6] Minn. Stat. 216E.10, subd. 1.

[7] Minn. Stat. 216E.03, subd. 7.

[8] Louise Solar, LLC (February 11, 2021) *Application for a Site Permit,* eDockets No. 20212-170899-02, -03, -04,-05, -06, -07, -08, -09,-10.

[9] Louise Solar, LLC (February 11, 2021) *Application for a Certificate of Need*, eDockets No. 20212-170897-02,-02, -03, -04 (trade secret), -05, -06, -07; *see generally* eDockets No. IP-7039/CN-20-646.

[10] If the commission grants a site permit, it chooses which of the studied locations is most appropriate. In this matter only one location is studied.

[11] *See generally* Minn. Stat. 216B and 216E.

[12] Scoping Decision, June 22, 2021, eDockets No. 20216-175266-01 .

Chapter 1 briefly describes Minnesota's role; discusses how this EA is organized; and provides an overview of the project.

Chapter 2 summarizes the regulatory framework, including the certificate of need and site permit processes, the environmental review process, and the other approvals that might be required for the project.

Chapter 3 describes the project—its design, construction, operation, and decommissioning.

Chapter 4 discusses the feasibility, availability, and potential impacts of system alternatives.

Chapter 5 describes the environmental setting; details potential human and environmental impacts; and identifies measures to mitigate adverse impacts. It summarizes the cumulative potential effects of the project and other projects and lists unavoidable impacts and irreversible and irretrievable commitments of resources.

Chapter 6 applies the siting factors the commission must consider to the project.

What does the applicant propose to construct?

A 50 MW solar energy generating system, collection line, gen-tie line, and associated facilities.

The project's primary components include photovoltaic ("PV") panels affixed to linear ground-mounted single-axis tracking systems, inverters and transformers housed in electrical cabinets, electrical collection system, project substation, and supervisory control and data acquisition ("SCADA") systems and metering equipment.[13] It also requires fencing, access roads, laydown areas, weather stations, and an operation and maintenance facility.[14] The project would interconnect to the electrical grid at the existing Adams Substation. The project substation would interconnect with the switching station through a 115 kV gen-tie transmission line approximately 700 feet long.[15]

What is the purpose of the project?

To increase solar generating capacity in Minnesota.

The applicant indicates the project is needed to "meet the growing commercial and industrial customer (C&I) demand for additional renewable energy resources, to accommodate the Solar Energy Standard set forth in Minnesota Statutes and to meet other clean energy requirements in Minnesota and neighboring states. The Project will provide cost-effective solar energy and help meet the Minnesota Renewable Energy Objectives (Minnesota Statutes §216B.1691)."[16] The project does not have a power purchase agreement at this time.[17]

[13] Site Permit Application, P. 1.
[14] Id.
[1515] Id.
[16] Site Permit Application, P. 2.
[17] Id.

Chapter 2: Regulatory Framework

Chapter 2 discusses the two approvals required from the commission—a certificate of need and site permit. It describes the environmental review process and lists the factors the commission considers when making decisions. This chapter also discusses required approvals from federal and state agencies and local units of government with permitting authority for actions related to the project. Lastly, it lists topics outside the scope of this EA.

What commission approvals are required?

A certificate of need and site permit are required, because the project meets several thresholds defined in Minnesota Statute.

The project requires a certificate of need because it meets the definition of *large energy facility*,[18] which means any electric power generating plant—including one powered by solar energy—with a capacity of 50 MW or more.[19]

The project requires a site permit from the commission because it meets the definition of *large electric power generating plant*,[20] which means any electric power generating equipment designed for or capable of operation at a capacity of 50 MW or more.[21]

A new gen-tie transmission line will interconnect the project to the electrical grid at the existing Adams substation.[22] This gen-tie line will be less than 1,500 feet in length; therefore, its construction does not require a separate commission route permit.[23] The project substation and gen-tie line are associated facilities as defined by Minnesota Rule 7850.1000, subpart 3, and, as a result, will be permitted as part of the project. Therefore, they are analyzed in this EA.

What permitting steps have occurred to date?

The commission accepted the certificate of need and site permit applications as complete on May 7, 2021. A virtual public information and scoping meeting was held on May 25, 2021.

Applicants must provide the commission with a written notice of their intent to file a site permit under the alternative process.[24] The applicant provided notice on December 10, 2020.[25] On February 11, 2021 the applicant filed separate certificate of need and site permit applications. The commission met to consider these applications at its April 8, 2021 agenda meeting. The applications were approved on

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18 Minnesota Statute 216B.243, subdivision 2.

19 Minn. Stat. 216B.2421, subd. 2(1).

20 Minn. Stat. 216E.03, subd. 1.

21 Minn. Stat. 216E.01, subd. 4.

22 Addendum, page 2 (overall length of the gen-tie transmission line currently estimated at 700 feet).

23 Minn. Stat. 216E.01, subd. 4 ("high voltage transmission lines" must be capable of operation of 100 kilovolts or more and be greater than 1,500 feet in length).

24 Minn. R. 7850.2800, subp. 2.

25 *Notice of Intent to File*, December 10, 2020, eDockets No. 202012-168926-01.

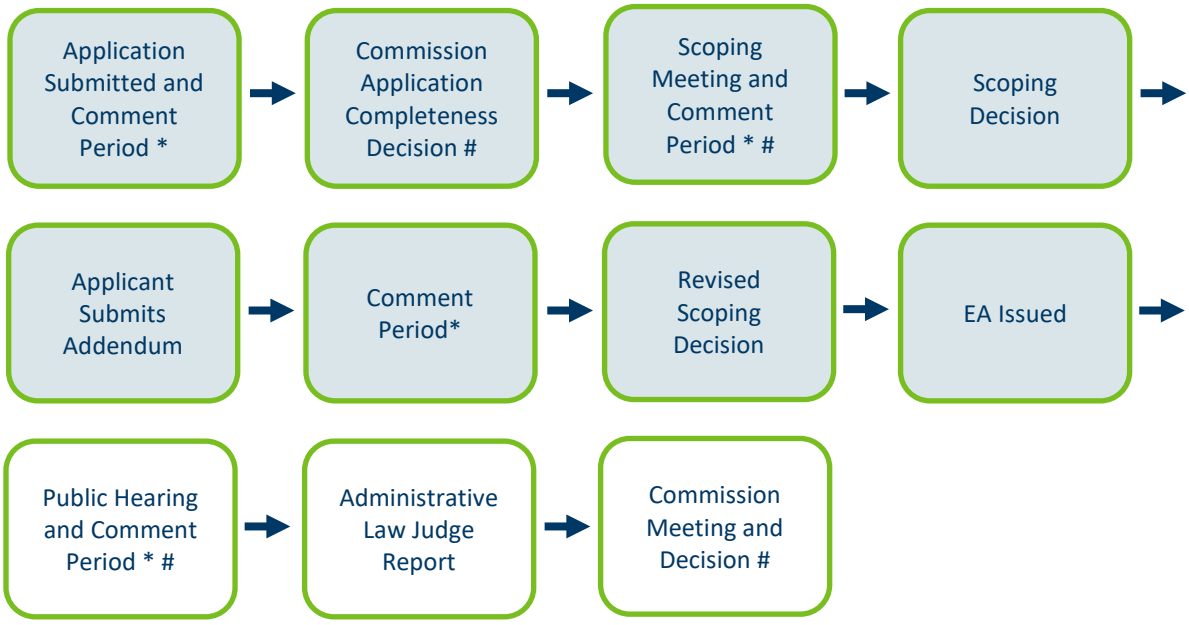
May 7, 2021.[26] The order also referred the matter to the Office of Administrative Hearings for appointment of an administrative law judge ("ALJ") to conduct a public hearing for the project.[27] Commission staff provided a *Sample Solar Site Permit* ("sample permit") on March 31, 2021.[28]

What is environmental review?

Environmental review informs interested persons about potential impacts and possible mitigation measures associated with the project; environmental review informs commission decisions.

Minnesota law requires that potential human and environmental impacts be analyzed before the commission decides whether to grant a certificate of need and site permit. This analysis is called environmental review. Figure 1 outlines the permitting process as it has unfolded for this project. (Read from left to right; shaded steps are complete; "*" means public comment opportunity and "#" means public meeting opportunity.)

Figure 1 Simplified Process Summary



Certificate of Need

Applications for a certificate of need require preparation of an environmental report ("ER").[29] An ER contains "information on the human and environmental impacts of the [project] associated with the size, type, and timing of the project, system configurations, and voltage".[30] It also contains information on system alternatives to the project, as well as mitigation measures.

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[26] See *Order Accepting Applications as Complete Authorizing Joint Review and Taking Other Actions* (May 7, 2021). eDockets No. 20215-173981-01.

[27] *Ibid*., page 6; *see also* Department of Commerce (August 9, 2019) *EERA Completeness Review*, eDockets No. 20198-155060-01 (as part of a summary proceeding the administrative law judge provides findings of fact, conclusions of law, and recommendations regarding the applications).

[28] PUC Staff Briefing Papers, March 31, 2021, eDockets No. 20213-172442-02.

[29] Minnesota Rule 7849.1200.

[30] Minn. R. 7849.1500.

Site Permit

Minnesota law provides the commission with two processes to review site permit applications. The alternative process, which applies to solar projects,[31] requires an EA instead of the more detailed environmental impact statement and a public hearing instead of the more formal contested-case hearing.[32,33]

Joint Proceeding

When there are multiple applications before the commission for a single project, the environmental review required for each application may be combined. The commission authorized commerce to combine the environmental review required for the certificate of need and site permit; therefore, these applications are being processed jointly using Minnesota Rule 7829.1200 and Minnesota Rule 7850.2800 to 7850.3900.[34]

Commerce staff prepared an EA in lieu of an ER. The analysis of issues typically reviewed in an EA and the system alternatives studied in an ER are combined into a single document. This is the only state environmental review document required for the project.[35]

Scoping Process

Scoping is the first step in the environmental review process. It helps focus the EA on the most relevant information needed by the commission to make informed decisions.

Scoping includes a public meeting and comment period that provide opportunities for interested persons to help develop the scope (or contents) of the EA.[36] On May 10, 2020 commission and commerce staff issued a joint *Notice of Public Information and Environmental Assessment Scoping Meeting* and associated public comment period.[37] Notice was sent to those individuals on the project contact list and to potentially affected landowners.[38] The applicant published notice in the *Austin Daily Herald* on May 13, 2021.[39]

Commission and commerce staff jointly held the public information and scoping meeting as noticed. The purpose of the meeting was to provide information and answer questions about the project and permitting process, and gather input regarding potential impacts and mitigative measures that should be studied in the EA. The meeting also provided an opportunity to solicit potential site or system alternatives. Due to the corona virus pandemic, the meeting was virtual. A court reporter was present to document verbal statements.

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31 Minn. Stat. 216E.04, subd. 2(8).

32 Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 1.

33 Applicants are free to elect the alternative process if their project qualifies for it.

34

35 Minn. R. 7849.1900, subp. 1; Mnn. R. 7859.3700, subp. 8.

36 Minn. R. 7850.3700, subp. 2.

37 Notice of Public Information and Environmental Review Scoping Meeting, eDockets No. 20215-173997-01.

38

39 Compliance filing of publication requirement, May 13, 2021, eDockets No. 20215-174130-01.

There were no public attendees joined the public meeting. Commission, commerce, and applicant representatives gave verbal presentations. No site or system alternatives were recommended for study.

A public comment period, ending June 9, 2021 provided an opportunity for interested persons to identify issues, mitigation measures, and site or system alternatives for study in the EA. Written comments were received from two state agencies, a laborer's union, and a local resident. Site or system alternatives were not recommended.

Scoping Comments Received

Scoping comments are compiled and available to view or download.

LIUNA of Minnesota and North Dakota submitted a comment in support of the project and economic benefits associated with using local unionized labor to construct the project.[40]

A local resident expressed concern that fencing around the project would lead to additional pressure on surrounding cropland by deer and wild turkey.[41]

Minnesota Department of Transportation (MnDOT) provided comments regarding site access from TH 56, the agency's Utility Accommodation Policy, and verifying stormwater run-off calculations for the project. MnDOT's comments are summarized below.[42] MnDOT notes that "any MnDOT permits applied for as a part of these projects will not be issued until the PUC has issued an approved site permit for this project."

- For any areas where the project intersects state highway rights of way, Louise Solar should adhere to MnDOT's Utility Accommodation Policy.
- Appendix A Maps 1-4 do not seem to illustrate new, direct site access from TH 56. New access to the proposed site via TH 56 is considered unnecessary given the availability of existing county and township roads currently accessible via TH 56 within/adjacent to the project area.
- MnDOT's District 6 Water Resources Engineer would like to see *and verify* storm water runoff calculations, including a summary table, showing that the Louise Solar Project will not be increasing peak runoff rate to MnDOT right of way.
- Any MnDOT land that Louise Solar may wish to occupy would need to be leased (in the areas where a lease is feasible) and any associated electrical collection systems *along* a trunk highway right of way would need to be permitted through a municipal, cooperative or investor owned electric service provider. MnDOT allows private parties to place connecting lines across trunk highway rights of way but does not allow private parties to place such facilities longitudinally along trunk highways.

[40] LIUNA *Scoping Comments* (March 8, 2021), eDockets No. 20213-171654-01
[41] G. Noterman *Scoping Comments*, (March 2, 2021), eDockets No. 20213-171494-02
[42] MnDOT *Scoping Comments* (June 9, 2021). eDockets No. 20216-174922-01.

Minnesota Department of Natural Resources (MDNR) commented on fencing of the site as relates to deer and the applicant's Vegetation Management Plan (VMP). MDNR's comments are summarized below.[43]

- To ensure complete deer exclusion from the solar facility, the *DNR's Fencing Handbook For 10 ft Woven Wire Deer Exclusion Fence* recommends 10-foot fencing and deer egress areas.

- DNR, along with other relevant state agencies, expects to review the revised Vegetation Management Plan for the project prior to finalization.

The Applicant submitted comments to further develop the record on prime farmland, decommissioning, and the vegetation management plan.[44] Specifically, the applicant supplements the record with additional information on the prime farmland analysis and decommissioning as requested during application acceptance.[45] The revised VMP will be available for review and comment prior to the hearing.[46]

Scoping Decision

The scoping decision identifies the issues studied in this EA.

After considering public comments and recommendations by staff, the assistant commissioner of commerce issued a scoping decision on June 27, 2021 (Appendix A). The scoping decision identifies the issues to be evaluated in this EA.

What criteria does the commission use to make decisions?

Minnesota statute and rule identify the factors the commission must consider when determining whether to issue a certificate of need and site permit.

After reviewing the project record—including public comments—the commission will make three decisions:

- Does the EA and the record created at the public hearing address the issues identified in the scoping decision?
- Is the project needed, and, if so, what permit conditions are appropriate?
- If the project is needed, should a site permit be issued for the project, and, if so, what permit conditions are appropriate?

Certificate of Need

The commission must determine whether the project is needed or if another project would be more appropriate for the state of Minnesota. Minnesota Rule 7849.0120 provides the criteria the commission must use when determining whether to grant a certificate of need.

[43] MDNR *Scoping Comments* (June 8, 2021). eDockets No. 20216-174868-01.
[44] Applicant *Scoping Comments* (June 9, 2021). eDockets No. 20216-174914-01.
[45] See *Order Accepting Applications as Complete Authorizing Joint Review and Taking Other Actions* (May 7, 2021). eDockets No. 20215-173981-01.
[46] Ibid.

A. The probable result of denial would be an adverse effect upon the future adequacy, reliability, or efficiency of energy supply to the applicant, to the applicant's customers, or to the people of Minnesota and neighboring states.
B. A more reasonable and prudent alternative to the proposed facility has not been demonstrated by a preponderance of the evidence on the record.
C. The proposed facility, or a suitable modification of the facility, will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health.
D. The record does not demonstrate that the design, construction, or operation of the proposed facility, or a suitable modification of the facility, will fail to comply with relevant policies, rules, and regulations of other state and federal agencies and local governments.

If the commission determines the applicant met these criteria, it will grant a certificate of need (with or without conditions). The certificate of need decision determines the type and size of the project but does not determine its location.

Site Permit

If the commission determines the project is needed, it must determine where it will be located. Minnesota Statutes 216E.03 lists considerations that guide the study, evaluation, and designation of site permits. Minnesota Rule 7850.4100 lists the factors the commission must consider when making a site permit decision.

A. Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services.
B. Effects on public health and safety.
C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining.
D. Effects on archaeological and historic resources.
E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna.
F. Effects on rare and unique natural resources.
G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.
H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries.
I. Use of existing large electric power generating plant sites.
J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way.
K. Electrical system reliability.
L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route.
M. Adverse human and natural environmental effects which cannot be avoided.
N. Irreversible and irretrievable commitments of resources.

The commission is also guided by the "state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure".[47]

The commission may not issue a site permit for a project that requires a certificate of need until a certificate has been approved by the commission, though these approvals may occur consecutively at the same commission meeting.

Are other permits or approvals required?

Yes, other permits and approvals are required for the project.

A certificate of need and site permit from the commission are the only state permits required for siting the project. However, various federal, state, and local approvals might be required for activities related to construction and operation of the project. These subsequent permits are referred to as "downstream" permits, and must be obtained by the applicant prior to construction.[48] Table 1 lists potential downstream permits that might be required, several of which are discussed below.

Federal

The U.S. Army Corps of Engineers ("USACE") "regulates the discharge of dredged or fill material into waters of the United States, including wetlands".[49] Dredged or fill material, including material that moves from construction sites into these waters, could impact water quality. A permit is required from USACE if the potential for significant adverse impacts exists. The USACE is also charged with coordinating with Indian tribes regarding potential impacts to traditional cultural properties.

A permit is required from the U.S. Fish and Wildlife Service ("USFWS") for the incidental taking[50] of any threatened or endangered species. As a result, USFWS encourages project proposers to consult with the agency to determine if a project has the potential to impact federally listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

State

Potential impacts to state lands and waters, as well as fish and wildlife resources, are regulated by the DNR. Licenses are required to cross state lands or waters.[51] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a *Public Waters Work Permit*.[52] Not unlike the USFWS, DNR encourages project proposers to consult with the agency to

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47 Minn. Stat. 216E.03, subd. 7(a).

48 Appendix C, Section 4.5.2 (stating the permittee "shall obtain all required permits for the project and comply with the conditions of those permits").

49 U.S. Environmental Protection Agency (October 27, 2015) *Section 404 Permit Program*, retrieved from: http://www.epa.gov/cwa-404/section-404-permit-program.

50 16 U.S. § 1532(19) (defining "take" to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct).

51 Minn. Stat. 84.415.

52 Minnesota Department of Natural Resources (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, retrieved from: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

determine if a project has the potential to impact state-listed threatened or endangered species. Additionally, consultation can lead to the identification of measures to mitigate potential impacts associated with the project.

Construction projects that disturb one or more acres of land require a general *National Pollutant Discharge Elimination System / State Disposal System Construction Stormwater Permit* ("CSW Permit") from the Pollution Control Agency ("MPCA"). This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[53] The CSW Permit requires use of best management practices; development of a Stormwater Pollution Prevention Plan; and adequate stormwater treatment capacity once the project is complete.

Projects must be designed so that stormwater discharged after construction does not violate state water quality standards. Specifically, projects with net increases of one acre or more to impervious surface must be designed to treat water volumes of one-inch times the net increase in impervious surface. PV panels are impervious, and are counted towards total impervious surface along with access roads, buildings, etc. The area beneath the panel, however, is pervious if properly vegetated. To account for this, MPCA developed a solar panel calculator that estimates the amount of stormwater retained by PV solar farms. This amount can be applied as a credit towards the total amount of stormwater treatment needed for a project.[54]

A Clean Water Act Section 401 *Water Quality Certification* from MPCA might also be required. "Section 401 of the Clean Water Act requires any applicant for a federal license or permit to conduct an activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates that the discharge complies the applicable water quality standards."[55] The certification becomes a condition of the federal permit.

Additionally, MPCA regulates generation, handling, and storage of hazardous wastes.

A permit from MnDOT is required for construction, placement, or maintenance of utility lines adjacent or across trunk highway rights-of-way.[56] Coordination would be required to construct access roads or driveways from trunk highways.[57] These permits are required to ensure that use of the right-of-way does not interfere with free and safe flow of traffic, among other reasons.[58]

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[53] Minnesota Pollution Control Agency (November 19, 2015) *Stormwater Program for Construction Activity*, retrieved from: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html.

[54] Minnesota Pollution Control Agency (January 22, 2020) *Minnesota Stormwater Manual*, retrieved from: https://www.pca.state.mn.us/water/minnesotas-stormwater-manual.

[55] Minnesota Pollution Control Agency (n.d.) *Clean Water Act Section 401 Water Quality Certifications*, retrieved from: https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications.

[56] Minn. R. 8810.3300, subp. 1.

[57] Minnesota Department of Transportation (n.d.) *Land Management*, retrieved from: https://www.dot.state.mn.us/utility/forms.html.

[58] Minnesota Department of Transportation (n.d.) *MnDOT Policies*, retrieved from: http://www.dot.state.mn.us/policy/operations/op002.html.

The State Historic Preservation Office ("SHPO") is charged with preserving and protecting the state's historic resources. SHPO consults with project proposers and state agencies to identify historic resources to avoid and minimize impacts to these resources.

The Department of Agriculture ("MDA") ensures the integrity of Minnesota's food supply while protecting the health of its environment and the resources required for food production. MDA assists in the development of agricultural impact mitigation plans that outline necessary steps to avoid and mitigate impacts to agricultural lands.

The Board of Water and Soil Resources ("BWSR") oversees implementation of Minnesota's *Wetland Conservation Act* ("WCA"). The WCA is implemented by local units of government.

Local

Mower County oversees local implementation of the WCA in the project area. The WCA requires that any person "proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value."[59]

Commission site permits preempt local zoning, building, and land use rules, regulations, or ordinances promulgated by regional, county, local, and special purpose government; however, coordination with local governments may be required for the issues listed below.

Access/Driveway Coordination may be required to construct access roads or driveways from county or township roads.

Public Lands Coordination would be required to occupy county or township lands such as forest lands, park lands, watershed districts, and other properties owned by these entities.

Overwidth Load Coordination may be required to move over-width or heavy loads on county or township roads.

Road Crossing and Right-of-Way Coordination may be required to cross or occupy county or township road rights-of-way.

Zoning Coordination may be required to meet certain zoning requirements.

Table 1 Potential "Downstream" Permits

Unit of Government	Type of Application	Purpose
Federal		
U.S. Army Corps of Engineers	Section 404 Clean Water Act – Dredge and Fill	Protects water quality by controlling discharges of dredged and fill material
	Section 10 – Rivers and Harbor Act	Protects water quality by controlling crossings of navigable waters
U.S. Fish and Wildlife Service	Threatened and Endangered Species Consultation	Consultation to mitigate impacts to federally-listed species
Tribal		

[59] Minn. R. 8420.0100, subp. 2.

American Indian Tribes	National Historic Preservation Act Section 106 Coordination	Coordination to prevent impacts to traditional cultural properties
State		
Department of Natural Resources	License to Cross Public Lands and Waters	License to prevent impacts associated with crossing public lands and waters
	State Threatened and Endangered Species Consultation	Consultation to mitigate impacts to state-listed species
	Water Appropriation Permit	To balance competing management objectives
Pollution Control Agency	Construction Stormwater Permit	Minimizes temporary and permanent impacts from stormwater
	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards
State Historic Preservation Office	National Historic Preservation Act Section 106 Consultation	Ensures adequate consideration of impacts to significant cultural resources
Department of Agriculture	Agricultural Impact Mitigation Plan	Establishes measures for protection of agricultural resources
Department of Transportation	Utility Permit	Controls utilities being placed along highway rights-of-way
	Driveway Access	Controls access to driveways along highways
	Oversize/Overweight Permit	Controls use of roads for oversize or overweight vehicles
Department of Health	Well Notification	Needed to install a water-supply well
Board of Water and Soil Resources	Wetland Conservation Act	Coordination with BWSR and local governments to ensure conservation of wetlands
Local		
Mower County	Utility Permit	Needed to construct or maintain electrical lines along or across county highway right-of-way
	Land Use Permit	Needed to remove pine plantations and shelter belts
	Shoreland Alteration Permit	May be needed for work in shoreland district
Local Governments	Road Crossing, Driveway, Oversize or Overweight, and Land Permits	Ensures proper use of local roads and lands

Do electrical codes apply?

Yes, if constructed the project must meet electrical safety code requirements.

The project must meet requirements of the National Electrical Safety Code.[60] These standards are designed to safeguard human health "from hazards arising from the installation, operation, or maintenance of conductors and equipment in electric supply stations and overhead and underground

[60] *See* Minn. Stat. 326B.35; Minn. R. 7826.0300, subp. 1 (requiring utilities to comply with the most recent edition of the National Electric Safety Code when constructing new facilities or reinvesting capital in existing facilities); *see also* Appendix C, Section 4.5.1 (requiring compliance with NESC standards).

electric supply . . . lines".[61] They also ensure that facilities and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided operational maintenance is performed.

The project must be designed to meet North American Electric Reliability Corporation requirements,[62] which define the reliability requirements for planning and operating the electrical transmission grid in North America.[63]

Are any issues outside the scope of this EA?

Yes, the scoping decision identified several issues that will not be studied.

This EA does not address the following:

- Any site alternative other than the site proposed by the applicant.
- Any system alternative not specifically identified in the scoping decision.
- The way landowners are compensated for use or sale of their land.

[61] IEEE Standards Association (n.d.) *2017 – National Electrical Safety Code Brochure*, retrieved from: https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/nesc_2017_brochure.pdf.

[62] Appendix C, Section 4.5.1.

[63] North American Electric Reliability Corporation (2017) *Standards*, retrieved from: http://www.nerc.com/pa/stand/Pages/default.aspx.

Chapter 3: Louise Solar Farm

Louise Solar proposes to construct an up to 150 MW solar farm in Adams and Lodi townships in Mower County, Minnesota. The project will occupy approximately 325 acres of the 613 acres under lease. This chapter describes the project and how it would be constructed. Additionally, it describes operation of the project and decommissioning.

Project Design

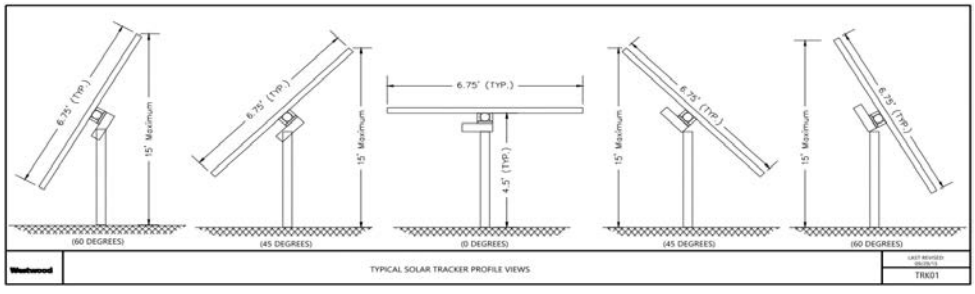
The project consists of photovoltaic (PV) solar panels mounted on a linear axis tracking system, an electrical collection system, a project substation, a switchyard and short transmission line to connect the project to the electrical grid, an operations and maintenance (O&M) building, fencing, and access roads.[64]

Solar panels are made up of PV cells that generate direct current (DC) electricity. The applicant proposes to place solar panels on a tracking system that will allow the panels to track the sun from east to west each day (Photo 1). The solar panels and tracking system will be arranged in rows oriented north and south so that the panels will face east in the morning, will be parallel to the ground mid-day, and will face west in the afternoon. This tracking of the sun maximizes the project's electrical production. When tilted to their highest position (early and late in the day), the top edge of the solar panels will be, at most, 15 feet above the ground.

Photo 1 Typical Solar Array and Tracking System

The applicant notes that the solar panels and tracking system will rely on up to four weather stations. These weather stations, up to 20 feet in height, would be located throughout the project area.[65]

Figure 2 Typical Solar Tracking Profile



Specific solar panels and tracking systems have not been selected.[1] The applicant notes that new solar panels, with higher efficiencies or outputs, are being introduced into the

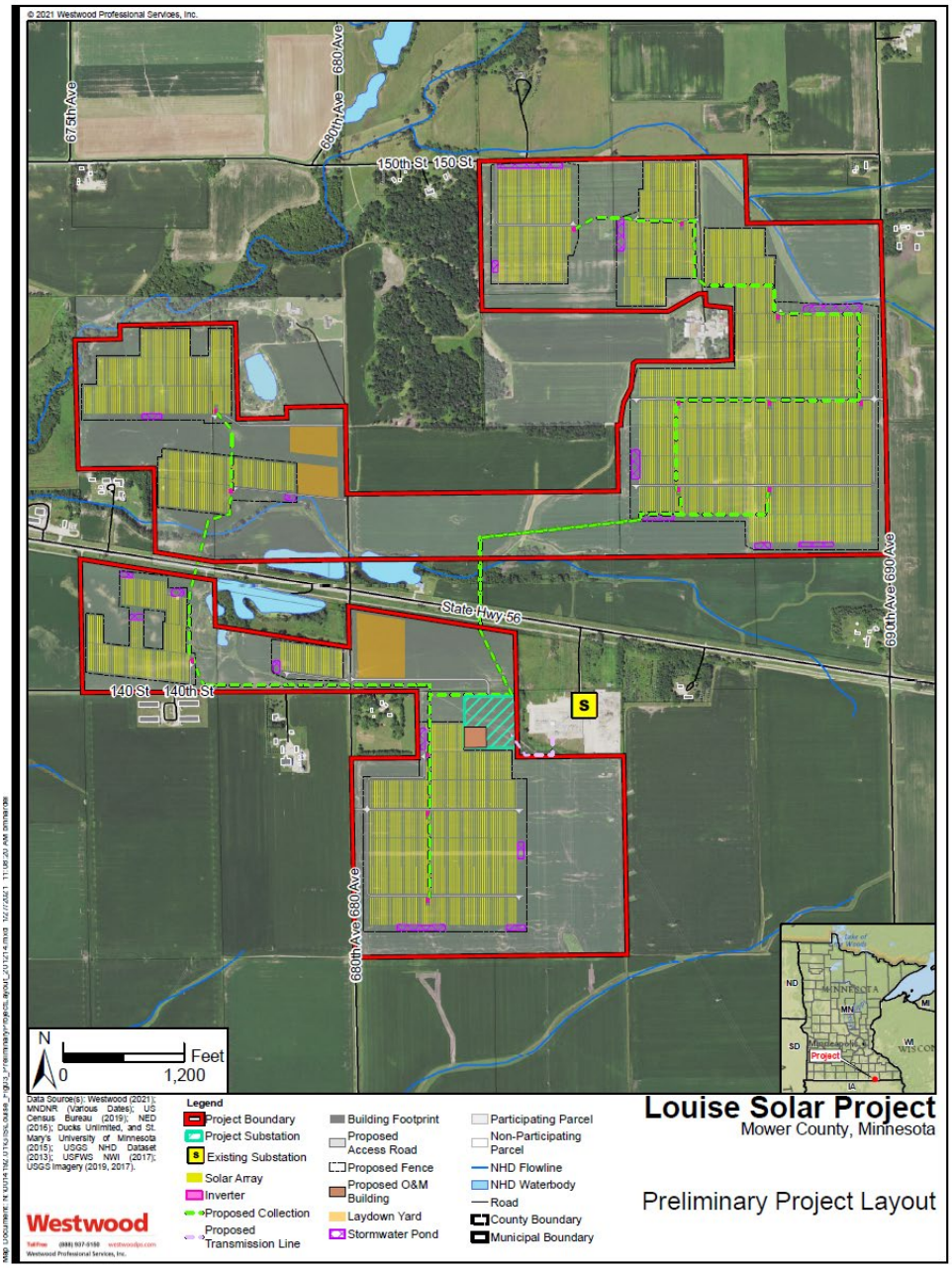
[64] Site Permit Application, P. 18.
[65] Appendix C (Agricultural Impact Mitigation Plan) of the Site Permit Application, P. 3.

market regularly.[66] Delaying selection of solar panels for the project could result in a project with a smaller footprint.

Electrical Collection System

The DC electrical energy generated by the solar panels will be collected at power inverters located throughout the project area (Map 2).

Map 2 Preliminary Project Layout



[66] Site Permit Application, P. 19.

The electrical collection cabling that connects the solar panels to the inverters will be installed underground. Cabling will be trenched four feet deep and two feet wide and deeper if necessary, to avoid other utilities or infrastructure.[67]

Power inverters and step-up transformers will be placed on inverter "skids," that will be located throughout the project area (Photo 2). Skids are steel pads approximately 10 feet wide by 25 feet long. The power inverters will be about 8 to 12 feet tall; the transformers about 9 feet tall. Thus, from a distance, inverters skids will look like one-half of a semi-trailer box. The skids will be placed on concrete slab foundations or on pier foundations.

DC electrical energy from the solar panels (about 1,500 volts DC) is changed to alternating current (AC) energy by the inverters (about 600 to 900 volts AC).[68] This AC energy is transformed to 34.5 kilovolts (kV) by the step-up transformer. Thus, energy from the solar panels enters the inverter skids as DC electricity and exits as 34.5 kV AC electricity.

Photo 2 Typical Inverter Skid

The applicant indicates that it has not yet selected power inverters (and associated step-up transformers) for the project[69] The final number of inverters will depend on the inverters selected for the project as well as the final solar panel configuration.

Electrical energy (34.5 kV AC) will be transmitted from each inverter skid to the project substation via an underground collection system.[70] The collection system will generally be placed two to five feet underground. The collection cables may be placed deeper to avoid existing utilities or other underground obstacles.

Project Substation

The project substation will be located within the Project Area Southern Unit and in proximity to the existing Adams Substation (Map 2 and Appendix A).[71] The area within the substation will be graveled to minimize risk of fire and will be fenced. Louise Solar will construct, own, and operate a 161-kV transmission line between ITC Midwest's Adams substation (Gen-Tie Line) and the project's substation. The substation's area will be approximately 521 feet by 525 feet once construction is complete. Final dimensions will depend on equipment selection, engineering, and design specifications.

[67] Site Permit Application, P. 20.
[68] Agricultural Impact Mitigation Plan, P. 4.
[69] Site Permit Application, P. 21.
[70] Site Permit Application, P. 20.
[71] The northeastern unit of the Project will be accessed from 150th Avenue and 690th Avenue, while the northwestern and southern portions of the Project will be accessed from State Highway 56, 140th Street, and 680th Street. These proposed entrances will have locked gates.

Operations and Maintenance Building

An operation and maintenance (O&M) facility for the project is planned on approximately 1 acre in the southwest corner of the project substation location near the Adams substation (Map 1). The O&M building will be used to remotely monitor solar modules and electrical equipment using a SCADA system, conduct maintenance and repair of project equipment (e.g., solar panels) and to store maintenance supplies (e.g., materials for cleaning solar panels).

Fencing

All solar arrays will be fenced for security. Fencing will be secured to posts that will be directly embedded in the soil or set in concrete foundations as required for structural integrity. Fencing will consist of either a 6- or 8-foot chain link fence with a top guard angled out and upward at 45degrees with 3-4 strands of smooth wire (no barbs). Agricultural fencing may be used place of chain link fence.

Access Roads

The Project will include approximately 3.9 miles of internal graveled access roads. These roads will be used for operations and maintenance activities. Roads will be 12 to 16 feet in width, with some wider sections at curves and intersections (Map 2 and Appendix A). Access roads are proposed for the northeastern portion of the project from 150th Avenue and 690th Avenue, with the northwestern and southern portions of the project accessed from State Highway 56, 140th Street, and 680th Street. These proposed entrances will have locked gates.

Project Construction

Project construction will begin only after all necessary permits and approvals have been received.[72] Construction begins with initial site preparation including grading, improving access, and preparing staging/laydown areas. The applicant estimates that 104 acres of the total project area will require grading. Typical construction equipment will be used for the project – scrapers, bulldozers, dump trucks, and backhoes. Additional specialty equipment could include a pile driver, crane, forklift, and drill rig.

After initial site preparation, solar arrays and associated access roads would be constructed. Solar arrays will be constructed in blocks, and multiple blocks will be constructed simultaneously. The tracking system and solar panels will be mounted on steel posts driven 8 to 15 feet into the ground. Pier depth will depend on final geotechnical analysis and design. Concrete foundations may be required in some areas. The tracking system and supports for the solar panels (racking) will be bolted to the posts. Solar panels, including electrical connections, grounding, and cable management systems, will be installed by crews using hand tools.

Inverter skids will be installed on concrete or pier foundations. Concrete foundations may be poured on-site or pre-cast and then assembled. Cable for the AC electrical collection system will be placed two to five feet underground. A trench will be excavated for the cabling in accordance with the agricultural impact mitigation plan (AIMP); topsoil and subsoil will be segregated and stockpiled.[73] Once cabling is installed in the trench, the trench will be backfilled with subsoil followed by topsoil.

[72] Site Permit Application, P. 26.
[73] Site Permit Application, Appendix C *Agricultural Impact Mitigation Plan*, P. 6.

As construction of the solar arrays begins, construction will proceed on the project substation. The foundation and grounding grid for the substation will be installed. Substation equipment will be delivered and stored on the foundation. The overhead 161 kV transmission line includes 5 wood or steel structures less than 100 feet tall.[74]

The applicant estimates that for several weeks – during delivery of the trackers and solar panels – there will be between 10 and 20 semi-truck deliveries daily. Traffic will decrease once these components are delivered. Workers at the site will use light duty trucks and cars for transportation.

The applicant estimates that the project will create approximately 350-400 temporary construction jobs and four full-time operational jobs.[75] The applicant indicates that it will prioritize the use of local, union construction craft employees to the greatest extent feasible consistent with other project constraints.[76]

Restoration

After construction, the project area will be graded to natural contours (as possible) and soils will be de-compacted.[77] Disturbed areas will be reseeded with native seed mixes in accordance with the project's vegetation management plan (VMP) and stormwater pollution prevention plan (SWPPP).[2] Erosion control measures will be used until seeded vegetation has established – e.g., silt fences, hydro-mulch, sediment control logs. Additionally, a cover crop will be planted to prevent erosion during the time it takes for native seeds / vegetation to establish. The applicant indicates that post-construction clean-up and restoration will take two to four months.

In accordance with the VMP, which is not finalized, the project will monitor seed establishment and vegetation to ensure restoration goals and objectives are met. Mowing, grazing, and selective use of herbicides are possible management strategies. Regular monitoring and adaptive management will guide long-term vegetation management on site.

Operation and Maintenance

The estimated service life of the project is 30 to 35 years.[78] The applicant indicates that maintenance of the project will include inspection of electrical equipment, vegetation management, and snow removal (as needed).[79] The electrical performance of the project will be monitored in real-time by a supervisory control and data acquisition (SCADA) system.[80] The SCADA system allows for early notification of abnormal operations, which facilitates prompt maintenance and repair.

Repowering and Decommissioning

As the project progresses through its service life, the applicant indicates that it may seek to repower the project with new, more efficient solar panels.[81] The applicant notes that more efficient and less

[74] Site Permit Application, P. 10.
[75] Site Permit Application, P. 27.
[76] Id.
[77] Site Permit Application, P. 28.
[78] Id.
[79] Site Permit Application, P. 29.
[80] Id.
[81] Site Permit Application, P. 31.

expensive panels appear to be the trend in the solar industry. Repowering with more efficient panels could result in a smaller project footprint or a project of the same size with a greater electrical capacity. The applicant indicates that it would obtain all federal, state, and local approvals for repowering including, if needed, a new site permit from the Commission.

If the project is not repowered, Hayward Solar will decommission the project and remove the project facilities.[82] Decommissioning would include removal of the solar arrays (panels, racking, and steel posts), inverters, fencing, access roads, lighting, the project substation, and the project O&M building.[83] Above-ground electrical cabling would be removed; below-ground cabling would be removed to a depth of four feet or in accordance with lease terms for individual landowners.[84]

The applicant will be responsible for all costs associated with decommissioning the project. This includes entering into a surety bond agreement and creating an escrow account or create a reserve fund.[85] Decommissioning and site restoration is estimated to take 12 months.

If the project is decommissioned, it is assumed the site will return to agricultural use.[86] Louise Solar will restore the site to pre-construction conditions to facilitate this use.[87] To this end, best management practices will be used during decommissioning to minimize soil erosion and maintain natural hydrology. Areas of compacted soils will be de-compacted to support agricultural use.

Project Costs

Louise Solar estimates the total cost to construct the project to be $62.05 million (Table 2).[88] Actual costs will depend on final material and labor costs. Operating and maintenance costs are estimated to be about $1.2 million per year.[89] The primary components of these costs are labor, materials, and taxes.

Table 2 Estimated Project Costs

Project Component	Baseline Cost (millions)
Design, procurement, and construction	$52.35
Development expense*	$2.5
Interconnection	$1.2
Financing**	$1.5
Transmission	$0.5
Substation	$4.0
Total	$62.05

[82] Id.
[83] Id.
[84] Site Permit Application, P. 32.
[85] Site Permit Application, P. 32.
[86] Site Permit Application, P. 33.
[87] Id.
[88] Site Permit Application, P. 17.
[89] Id.

[1] Id.

[2] Id.

Chapter 4: Alternatives to the Project

This chapter evaluates alternatives to the project, including a no-build alternative. The EA must provide a general description, discuss potential human and environmental impacts and possible mitigation measures, and analyze the feasibility and availability of each system alternative studied. It must also describe specific emissions, water, and waste related impacts.

The applicant requested exemptions from certain certificate of need filing requirements concerning alternatives to the project that otherwise must be discussed under Minnesota Rule 7849.1500. The commission authorized these exemptions.[90] As a result, the following system alternatives are not studied: demand side management;[91] purchased power;[92] facilities using a non-renewable energy source;[93] upgrading existing facilities;[94] and transmission rather than generation.[95]

Need for the Project

The project would contribute to satisfying utility and consumer demands for renewable energy.

The applicant proposes to construct the project to "meet the growing commercial and industrial customer (C&I) demand for additional renewable energy resources, to accommodate the Solar Energy Standard set forth in Minnesota Statutes and to meet other clean energy requirements in Minnesota and neighboring states. The Project will provide cost-effective solar energy and help meet the Minnesota Renewable Energy Objectives (Minnesota Statutes §216B.1691)."[96] While constructed in Minnesota, the electricity generated could ultimately be sold to utilities and companies in neighboring states. North and South Dakota have voluntary 10 percent from renewable standards; Wisconsin requires 12.89 percent from renewables; and Michigan requires 15 percent from renewables by 2021.[97] Minnesota's renewable standards are discussed in more detail below.

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90 Public Utilities Commission (May 13, 2019) *Order Regarding Exemption from Certain Certificate of Need Application Content Requirements*, eDockets No. 20195-152889-01.

91 Department of Commerce (April 4, 2019) *Comments*, eDockets No. 20194-151713-01, page 6 (the applicant "is not a regulated utility, has no retail customers, and plans to sell the project's output into the wholesale market. For these reasons, and the fact that the project is a renewable energy project, conservation programs could not serve as an alternative to the project").

92 *Id.*, page 4 (the applicant "is proposing to produce power to sell to utilities in the market, and thus is in the business of selling rather than purchasing power").

93 *Id.*, page 5 ("since the intent of the project is to provide renewable energy to sell to the market, examination of non-renewable alternatives would be irrelevant").

94 *Id.*, pages 4, 5 (the applicant "is not a vertically integrated regulated utility and therefore has no existing facilities in Minnesota for which efficiency could be improved to mitigate the need for the project").

95 *Id.*, page 7 ("transmission facilities are not true alternatives to the [p]roject as the purpose of the [p]roject is to increase the available supply of renewable energy").

96 Revised Site Permit Application, page 3.

97 Xcel Energy (July 1, 2019) *Upper Midwest Integrated Resource Plan 2020-2034*, retrieved from: https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/The-Resource-Plan-No-Appendices.pdf, page 59.

Solar Energy Standard

In 2013, the Minnesota Legislature established the Solar Energy Standard ("SES") requiring electric utilities to obtain at least one and one-half percent of their total Minnesota retail sales from solar energy by the end of 2020, with a goal of obtaining 10 percent of these sales from solar energy by 2030.[98] Three utilities are subject to the SES—Minnesota Power, Ottertail Power Company, and Xcel Energy—and are required to submit annual reports detailing compliance efforts. These efforts are summarized in *Minnesota Renewable Energy Standard: Utility Compliance* prepared by the Division of Energy Resources within Commerce.[99]

Renewable Energy Standard

In 2007, the Minnesota Legislature established a Renewable Energy Standard ("RES") requiring electric utilities to "generate or procure" sufficient electrical generation to meet standard percentages. These standards require that 25 percent of total electric sales to retail customers in Minnesota be generated by renewable energy by 2025. Utilities are required to submit annual reports detailing compliance efforts, which are also summarized in *Minnesota Renewable Energy Standard: Utility Compliance*.

The current RES requires Xcel Energy to obtain 25 percent of its Minnesota retail sales from renewables, and all other utilities subject to RES requirements to obtain 17 percent of their Minnesota retail sales from renewables. All utilities subject to the Minnesota RES have demonstrated compliance with 2017 RES requirements.

System Alternatives

The project is one way to satisfy utility and consumer demands for renewable energy. Other ways include a solar farm in a different location or a wind farm.

The system alternatives studied in this EA are those noted in the scoping decision. They include a 50 MW solar energy generating system in a different location and a 50 MW large wind energy conversion system. A no-build alternative is also studied. The analysis in this EA describes the differences between the project and system alternatives and assumes alternatives are sited on agricultural lands in other areas of the state.

50 MW Solar Farm

A 50 MW solar energy generating system sited elsewhere in Minnesota would support the need for additional solar energy but address specific concerns with the project's proposed location that could not be addressed through mitigation. Such an alternative could be a single 50 MW solar farm or a combination of smaller distributed solar farms. Three utility-scale solar energy generating systems

[98] Excluding retail sales to customers that are iron mining extraction and processing facilities, or paper mills and wood products manufacturers from the retail sales calculation. The statute further requires that at least 10 percent of the 1.5 percent SES goal be met by solar energy from facilities with a nameplate capacity of 20 kW or less.

[99] Department of Commerce (January 15, 2019) Minnesota Renewable Energy Standard: Utility Compliance, retrieved from: https://www.leg.state.mn.us/docs/2019/mandated/190330.pdf; *see also* Department of Commerce (November 2018) *Minnesota Renewable Energy Update*, retrieved from: https://mn.gov/commerce-stat/pdfs/2017-renewable-energy-update.pdf.

have been permitted by the commission.[100] The analysis for this alternative relies on data from these, and other, solar projects.

50 MW Wind Farm

A 50 MW large wind energy conversion system is an alternative renewable energy source. Such an alternative could be a single 100 MW wind farm or a combination of smaller dispersed wind farms.

Wind energy conversion technology consists of a set of wind-driven turbine blades that turn a mechanical shaft coupled to a generator, which in turn produces electricity. The major components of a wind turbine include rotor blades, shaft, gear box, generator, nacelle (which houses the shaft, gear box, and generator), safety lighting (attached to nacelle), yaw system (orientates turbine towards the wind), tower, power cables, and foundation. Most turbines have a dedicated or shared access road. Multiple turbines are connected via electrical collection lines, often buried, which collect and funnel the generated electricity to a project substation. The substation is connected to the electrical grid.

Wind farms require large land areas (thousands of acres) for siting and installation of infrastructure where developers have obtained wind rights. Due to the size of wind turbines, internal and external setbacks are necessary for operational efficiency. Like solar farms, wind farms include multiple construction sites for installing individual components, such as turbines, substation, access roads, etc.

The locality, capacity, and availability of the interconnection point to the electrical grid is a significant consideration in planning new wind farms—not unlike solar farms—and can be a significant contributor to overall cost. Most wind farms are sited as close as possible to a suitable interconnection point. The developer absorbs costs associated with permitting and constructing power lines to the interconnection point, making the interconnection, and needed upgrades to the electrical grid so that it can accommodate output from the facility.

Multiple large wind energy conversion systems have been permitted by the commission. The analysis for this alternative relies on data from these projects.

No-Build Alternative

The no-build alternative means nothing is constructed. The analysis for this alternative considers potential impacts if the project is not constructed.

Potential Impacts and Mitigation of System Alternatives

How are potential impacts associated with the project different from those associated with the studied system alternatives?

Potential impacts are difficult to assess for generic projects because the environmental setting is unknown. Many impacts are site specific and determined by location. Impacts for system alternatives are discussed in generic terms.

[100] Aurora Distributed Solar Project (Docket No. E6928/GS-14-515); North Star Solar Project (Docket No. IP6943/GS-15-33); Marshall Solar Project (Docket No. IP6941/GS-14-1052).

Associated facilities are similar for both solar farms and wind farms. The size and length of these facilities would vary depending on the location of the project and type of electrical interconnect, making potential impacts difficult to quantify; however, impacts generally increase with size and length. Generally, above-ground facilities cause greater aesthetic impacts and potential impacts to birds and bats. Below-ground facilities can mitigate some above-ground impacts but cause greater impacts to soils.

50 MW Solar Farm

The types of impacts associated with a 50 MW solar farm constructed in another location (or multiple locations) would be similar to those of the project. For example, a solar farm in another location would also be powered by solar energy, and, as result would not emit criteria pollutants. However, there are differences between locations that would influence or change potential impacts.

Archeological and Historic Resources

Because this analysis assumes this system alternative would be constructed on previously disturbed farmland, potential impacts would be similar. Should the alternative be constructed near or adjacent to historic features, or constructed on pasture land as opposed to cultivated land, the potential for impacts may increase.

Human Settlement

Potential aesthetic and noise impacts are highly dependent on the number of neighboring receptors and their distance from the system alternative. There are no homes within the proposed project area, therefore an alternative with receptors would likely have a greater level of impact. The project is bisected by State Highway 56 and located in area with other large utility infrastructure such as wind turbines and the ITC Midwest 345 kV transmission lines. The project will be visible from roadways and will further alter the local landscape. Depending on location, a system alternative constructed away from a major highway may have a smaller aesthetic impact to the travelling public while still impacting residents. Topography, landscape features, and vegetation influence noise related effects. System alternatives with landforms or dense vegetation between the project and the receptor would likely reduce noise related impacts.

The project could impact neighboring landowners' sense of place. Differing responses to infrastructure projects can impact a community's shared sense of self. The presence of existing infrastructure, such as areas with significant electrical, rail, road, or other built infrastructure, such as wind turbines can impact cultural values. Individuals and communities may be more receptive to solar generation than others. To date there have been no tensions or concerns between the project and cultural values; a solar farm in a different location could impact a community's cultural values.

Potential impacts to recreation include the Shooting Star State Trail. The trail, a converted railroad right-of-way, is located just outside of the project boundary, paralleling State Highway 56 to the south. The Shooting Star State Trail provides biking, running, and walking opportunities for area residents. A portion of nearby snowmobile track 176 is located about 0.5 miles from the Project Area boundary. An alternative site could avoid impacts to recreation depending on recreation resources in the project area or could have greater impacts if located in an area with numerous recreation opportunities. An alternative constructed on, or adjacent to, non-compatible land uses or zoning would result in greater impacts.

A system alternative of a similar type and location is expected to have similar potential impacts from stray voltage and electronic interference.

The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations. Negative socioeconomic impacts would occur if a project location does not meet these same thresholds. The project is required to pay production taxes, which positively impacts the operating budgets of local units of government. Economic benefits associated with using local labor rather than non-local labor are difficult to assess because they are influenced by a variety of factors, including the amount of supplies and materials that can be purchased locally, the availability of local workers (including skilled workers), and other market factors.

Potential impacts to property values are difficult to determine because they are influenced by a complex interaction of factors; however, impacts would be expected to be similar to the proposed project. Site specific constraints, such as existing topography and vegetation between effected parcels could influence the impact. The project does not displace any residences or buildings and it is assumed that any system alternative also would not displace residences or buildings.

Human Health and Safety

Because this system alternative is similar in type to the proposed project, potential impacts from electromagnetic fields ("EMF") and to implantable medical devices and worker safety are expected to be similar. These impacts might increase should an alternative be constructed near a sensitive receptor, such as a hospital or nursing home. Impacts to emergency services would, in a rural area, be similar; however, should a system alternative be constructed in a more populated area, indirect impacts to emergency services resulting from traffic delays or detours could be more prevalent during construction.

Public Services

Public services, such as airports, utilities, and roadways can be impacted by utility infrastructure. Solar farms do not impact airport operations; therefore, effects would be similar regardless of location. Potential impacts to local utilities depend upon the utilities present. As with the proposed project, service interruptions may occur when the project is interconnected to the grid and during system maintenance but would not cause long-term (more than 24 hours) interruptions. Roads and highways are impacted primarily by increased traffic and some heavy-haul loads during construction. Potential impacts to roads and highways would be similar. Local roadways are more likely to experience impacts due to the rural nature and size of the project. A system alternative would have similar impacts on highways and local roads.

Land-based Economies

Because this analysis assumes that the system alternative would be constructed on farmland, impacts to agriculture would be similar in terms of total acres taken out of production. A portion of the project impacts prime farmland. Depending on location, a system alternative located entirely on prime farmland would have greater impacts.

Mining and forestry operations are not compatible with solar farms. Solar projects are generally sited on open land that is not forested or mined. A system alternative located on forested land would have a significant impact on forest resources. Avoidance of these resources is the primary mitigation.

There are no potential impacts to tourism from the proposed project. A system alternative may impact tourism depending on location and the level of tourism and related resources in a given area.

Natural Resources

Differences in air quality may occur if the project is located along unpaved roads. Without mitigation dry weather would increase levels of fugitive dust, negatively impacting air quality and indirectly impacting nearby surface waters. Increased water usage to control fugitive dust in the project location could occur during construction.

There are no designated sole source aquifers or wellhead protection areas where the project is located. Additionally, there are no private wells within the project boundary. An alternative location might be in an area with greater or lower potential impacts to groundwater and private wells. There are few wetlands and no surface waters within the land control area. The project is not proposed to be constructed in a floodplain. These features are generally avoided when siting solar farms and impacts would likely be similar in a different location.

Because this analysis assumes a system alternative would be constructed on farmland, impacts to wildlife and wildlife habitat would be similar. An alternative constructed in closer proximity to DNR Wildlife Management Areas, Aquatic Management Areas, Sites of Biodiversity Significance, or Scientific and Natural Areas; or USFWS Waterfowl Production Areas impacts could be greater due to both the potential for greater numbers of wildlife in the area and the location being a heavily used wildlife movement corridor. Should a system alternative project be constructed in an area with higher numbers of rare and unique natural resources, effects are expected to be greater.

Similar to the resources discussed above, impacts to vegetation are expected to be minimal. The Soils within the project boundary range from well drained to poorly drained. Impacts to soil resources vary by soil type. Therefore, impacts to soils at a different location could be greater or lower depending on soil type. Because this system alternative is a similar type of project, potential impacts to geology and topography would be similar except in areas of very shallow (10 to 15 feet) or exposed bedrock.

50 MW Wind Farm

The types of impacts associated with a 50 MW wind farm constructed in another location (or multiple locations) would be similar to those of the project. For example, wind farms do not emit criteria pollutants and are strategically sited to have few or minimal impacts to the human environment and natural resources. However, there are differences between solar and wind generation, for example, tower height and rotor swept zone, that influence or change potential impacts. Another notable difference between wind facilities and solar facilities is the land use conversion that occurs while a solar farm is operational. Most farming activities can continue in the presence of wind turbines, whereas on a solar farm, land is converted to renewable energy production until the project is decommissioned.

Archeological and Historic Resources

Potential impacts are expected to be similar or greater depending on location. Wind turbines can be seen from a further distance, thereby increasing potential effects to the viewshed and use of nearby historic resources. Should the wind farm be constructed on pasture as opposed to cultivated land, the potential for negative effects to archeological resources could increase.

Human Settlement

Aesthetic impacts are greater at wind farms due to turbine height and nighttime lighting. If the wind farm was constructed in an area without wind generation on the landscape, it would be more noticeable. Topography, landscape features, and vegetation influence visual impacts. Night-time lighting impacts can potentially be mitigated by utilizing available and approved light mitigating technologies, which reduce the number of lights, the duration, or the intensity.

Turbines produce audible noise while operational. Mechanical noise can be omitted by the gear box inside the nacelle, as well as when the blades sweep past the tower. The actual sound perceived by the receptor would depend on the type and size of the turbine, the speed of the turning turbine, and distance from the turbine. Operational noise is greater at a wind farm than solar farm. Turbines also generate low frequency noise, which is omitted at a frequency below the normal range of human hearing. Individuals highly sensitive to low frequency noise—provided their residence is very close to an operating turbine—could perceive it as pressure, vibration, or a pulse. Low frequency noise has not been shown to cause negative health impacts to humans.

A wind farm could change neighboring landowners' sense of place. Differing views concerning infrastructure project can erode a community's shared sense of self. These impacts to cultural values can, at times, be mitigated by the presence of an existing infrastructure, such as areas with significant electrical, rail, road, or other built infrastructure such as existing wind turbines. Some individuals or communities might accept wind generation more than others. Significant tension between wind generation and cultural values has occurred in Minnesota for select projects.

Due to turbine height, wind farms are visible from greater distances, potentially impacting recreationalists at greater distances. A system alternative not adjacent to a campground or other recreational opportunities would reduce potential impacts. Wind farms could preclude future land use or zoning.

Because wind farms are electrically grounded, impacts from stray voltage would not be expected. Electronic interference is not expected and would be like the project. Wind turbines can block or partially block the line-of-sight path between microwave transmitters and receivers causing interference. Wind turbines can interfere with over-the-air television signals when the turbine—including the rotor swept area—is located within the signal path between the broadcaster and receiver.

The project would not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations. Negative socioeconomic impacts would occur if a wind farm does not meet these same characteristics. Similar to the project, a wind farm would be required to pay production taxes. Benefits of using local labor verse non-local labor are difficult to determine because they are influenced by a variety of factors, including the amount of supplies and materials that can be purchased locally, the availability of local workers (including skilled workers), and other market factors. Local businesses, for example, restaurants and grocery stores, would likely see a temporary positive increase in business from non-local labor.

Potential impacts to property values are difficult to determine because they are influenced by a complex interaction of factors. There is no evidence that wind farms cause widespread, negative

impacts to property values; however, that does not mean that negative effects do not occur.[101] If the wind farm was constructed in an area without wind generation on the landscape there could be more noticeable short-term impacts to property values. While extremely rare, wind farms have potential to displace residences or buildings, should this occur, impacts are mitigated through financial payments.

Human Health and Safety

Potential impacts from EMF and to implantable medical devices would be similar. Like the project, all equipment is electrically grounded. When operating, wind turbines generate EMF from mechanical components located within the nacelle. Minimum setback distances (1,000 feet) minimize potential impacts to residents and residences given that EMF generated by turbines dissipates to minimal levels within 500 feet of the nacelle. Potential impacts might be greater should a wind farm be constructed near a sensitive receptor, such as a hospital or nursing home.

Potential impacts to worker safety would be similar given adherence to Occupational Safety and Health Administration standards. Impacts to emergency services would, in a rural area, be similar; however, should a wind farm be constructed in a more populated area, indirect impacts to emergency services resulting from traffic delays or reroutes could be more prevalent during construction.

Public Services

A wind farm has greater potential to impact aviation, because of the vertical nature of wind turbines. Wind farms can negatively affect airport operations and air traffic. Potential impacts are mitigated by siting wind farms away from airports. Additionally, proposed turbine locations must be reviewed by the Federal Aviation Association ("FAA"), and appropriately lighted per FAA requirements. Additionally, permittees are required to notify local airports prior to construction.

Potential impacts to local utilities depend upon the utilities present. As with the project, service interruptions are likely to occur, but would likely not cause long-term (more than 24 hours) interruptions.

Roads and highways are impacted primarily by increased traffic and some heavy-haul loads during construction. More heavy-haul and oversized loads are required when constructing wind farms. Because of this, increased levels of structural damage can occur to local roads. Damages created by wind farm construction must be repaired by the permittee, but associated road construction can potentially impact local traffic routes and flow. Permittees are required to acquire permits and approvals from MnDOT, and to develop road use, or development, agreements with county and township road authorities. These permits, approvals, and agreements minimize traffic impacts, including potential for accidents.

Land-based Economies

If constructed on farmland, impacts to agriculture would be significantly less in terms of total acres taken out of production. A wind farm does not preclude agricultural production, although it might limit certain activities in select locations, such as aerial spraying. Farmers are compensated for construction impacts, such as crop loss, reduced yields, or drain tile damage.

[101] Department of Commerce (May 2018) *Environmental Report: Bitter Root Wind Project*, retrieved from: https://mn.gov/eera/web/file-list/2015/.

Mining and forestry operations would be precluded near individual turbines but would not necessarily be precluded entirely. Impacts to forestry operations is very rare as heavily wooded areas are not typically targeted for wind farm development.

Potential impacts to tourism would be expected if the wind farm can be heard or seen at tourism type locations. Impacts can potentially be minimized through setbacks to structures or non-participating property boundaries.

Natural Resources

Developers generally avoid surface waters and wetlands, but impacts do occur from placement of underground collector lines and if construction crane paths cross wetlands. Permittees must obtain necessary permits and approvals to cross surface waters and wetlands, and impacts are generally temporary. Significant wetland impacts can be mitigated through compensatory wetland banking. Surface waters are generally avoided. Groundwater impacts could be greater from concrete leaching due to the significantly larger size and depth of turbine foundations. Depending on water quantity needs and location, a DNR *Water Appropriations Permit* may be required, which monitors and minimizes groundwater impacts.

Should a wind farm be constructed within a floodplain potential impacts could occur; however, wind farms would not noticeably reduce flood storage capacity of the floodplain cross-section. Wind turbines and associated facilities are rarely located in floodplains.

Wind farm development causes direct impacts to wildlife as turbine blades can strike and kill various bat and bird species. Wind farms operating in Minnesota show higher bat fatalities than bird fatalities. Bat fatalities are thought to increase when the turbine is operating at low wind speeds. Bat fatalities also increase from mid-July through September during bat migration periods. Operational adjustments, such as “feathering” the blades, which stops the turbine blades from spinning until wind speeds are high enough to begin generating electricity, can minimizes bat fatalities at times of low wind speed.

Bird impacts are not as clearly attributed to seasonality. Most birds demonstrate some degree of turbine avoidance during flight. The majority of bird strikes are thought to result from situations of reduced visibility (heavy fog), distracted flight behavior (courtship or prey pursuit), difficult flight conditions (high or gusty winds), or increased exposure to the wind turbine locations (species that appear to prefer disturbed areas). Impacts to some avian species can be mitigated by locating turbines away from preferred habitat types, nesting areas, and known flight and migration corridors.

Potential impacts to wildlife habitat would be similar; however, an alternative constructed closer to DNR Wildlife Management Areas, Aquatic Management Areas, Sites of Biodiversity Significance, or Scientific and Natural Areas; or USFWS Waterfowl Production Areas could result in greater impacts wildlife and their habitats. Impacts could increase because of a greater number of wildlife in the area, the potential for the to be heavily used as a movement corridor, or reduced use of available habitat. State and Federally owned lands, managed for wildlife, are non-participating lands. Proposed wind turbine locations must be setback from property boundaries to meet required wind access buffers. Wind access buffers are thought to help reduce impacts to wildlife habitat utilization.

Should a wind farm be constructed in an area with higher numbers of rare and unique natural resources, potential impacts are expected to be greater.

Impacts to vegetation and soils would be similar. Effects from clearing, sedimentation, erosion, and compaction are dependent on location. Permit requirements require unnecessary vegetative clearing, and that impacts be mitigated to the extent possible. Wind farm construction and operation would impact less land area per MW of electricity produced. On average, a wind farm requires approximately two to three acres of land per MW, whereas a solar farm requires about six to eight acres.

Wind farms would similarly impact geology and topography unless the system alternative was constructed in an area of shallow (10 to 15 feet) or exposed bedrock.

Impacts of Power Plants

Minnesota Rule 7849.1500, subpart 2, requires that specific impacts from large electric power generating plant be discussed in the environmental document.[102] Subpart 2 focusses, generally, on air and water quality, aesthetics, noise, and hazardous waste.

Potential impacts to air quality would be similar. Wind farms are typically developed across a larger area. The larger project area results in higher use and travel on gravel roads. As a result, material delivery and construction result in increased levels of fugitive dust, negatively affecting air quality and indirectly impacting nearby surface waters during construction. Increased water usage to control fugitive dust in could occur.

Air Pollutants Sulfur dioxide, nitrogen oxides, carbon dioxide, mercury, and particulate matter are known as primary pollutants. Primary pollutants form directly and must be emitted by a source.[103] Because solar farms and wind farms do not burn fuel, they do not emit the above-mentioned pollutants. Temporary impacts during construction and operation are similar and include short-term air emissions from exhaust and fugitive dust. Exhaust emissions from construction equipment and vehicles traveling to and from the facility will occur during construction. Fugitive dust occurs from earth moving activities and vehicle travel on unpaved roads. These impacts are influenced heavily by weather conditions and the specific construction activity occurring. Once construction is complete, exhaust and dust emissions related to vehicular traffic would be reduced. Limited emissions would occur during routine maintenance and repairs.

Hazardous Air Pollutants and Volatile Organic Compounds "Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects."[104] Minor emissions of toxic air pollutants at solar farms would occur from vehicle and equipment use and from solvents and coatings used during equipment maintenance and building

[102] Minnesota Rule 7849.1500, subpart 2, requires certain potential impacts be addressed. This subsection addresses subparts 2(A) (air pollutants); 2(B) (hazardous air pollutants); 2(D) (ozone); 2(F) (associated facilities); 2(G) (water use); 2(H) (wastewater); and 2(I) (solid and hazardous waste). Subparts 2(C) (aesthetics) and 2(J) (noise) are discussed in the Potential Impacts and Mitigation section of this chapter beginning on page 29. Subpart 2(E) (fuel sources) is not discussed because questions of fuel source availability, fuel requirements, and fuel transportation do not apply to projects using the sun and wind.

[103] University of Calgary (September 3, 2018) *Energy Education: Primary Pollutant*, retrieved from: https://energyeducation.ca/encyclopedia/Primary_pollutant.

[104] U.S. Environmental Protection Agency (February 9, 2017) *What are Hazardous Air Pollutants?*, retrieved from: https://www.epa.gov/haps/what-are-hazardous-air-pollutants.

upkeep. Emissions at wind farms would be similar, with the addition of petroleum-based fluids used in the operation of wind turbines, such as gear box oil, hydraulic fluid, and grease.

Ozone A secondary pollutant, ground level ozone "is not emitted directly into the air but is created by chemical reactions between nitrogen oxides and volatile organic compounds. This happens when pollutants emitted by [different] sources chemically react in the presence of sunlight."[105] Solar farms and wind farms do not produce ozone or ozone precursors. However, any transmission line associated with a project, whether new or existing, would generate small amounts of ozone and nitrous oxide.

Water Appropriation and Wastewater Streams According to the U.S. Geological Survey, 133 billion gallons of water are withdrawn each day in the United States to cool thermoelectric power plants.[106] (The vast majority of this water is returned to the source.) Solar farms and wind farms are not thermoelectric power plants—they do not use water to generate electricity or for cooling. Water is not "appropriated to operate" these facilities, and they do not discharge wastewater.

Solid and Hazardous Wastes If not properly handled, solid and hazardous wastes can contaminate air, soils, and water, which can cause a variety of human and environmental impacts depending on the type and amount of contamination.

Solar farm and wind farm construction generates solid waste, such as scrap wood and metal, plastics, and cardboard. Petroleum products would be present on-site, including engine and hydraulic oil, lubricants, grease, cleaning solvents, and fuel. Operation is not expected to generate significant qualities of solid and hazardous wastes—but more so for wind farms. Small quantities of petroleum products would be kept onsite for routine maintenance activities. Certain electronic components in both solar farms and wind farms, such as circuit boards, contain hazardous materials commonly found in electronic devices.

"In Minnesota, solar panels discarded by commercial entities must be assumed to be hazardous waste due to the probable presence of heavy metals, unless they are specifically evaluated as non-hazardous. Heavy metals in solar panels can include arsenic, cadmium, lead, and selenium. If hazardous waste, they must be properly disposed of in a special facility or recycled if recyclers are available."[107]

No-Build Alternative

The analysis of a no-build alternative involves a discussion of the environmental impacts of continuing the status quo. For example, the no-build alternative for a proposed highway project addresses the

[105] U.S. Environmental Protection Agency (October 31, 2018) *Ground-level Ozone Basics*, retrieved from: https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics#formation.

[106] U.S. Geological Survey (n.d.) *Total Water Use*, retrieved from: https://www.usgs.gov/mission-areas/water-resources/science/total-water-use?qt-science_center_objects=0#qt-science_center_objects.

[107] Pollution Control Agency (April 2018) *2017 Toxics and Pollution Prevention Evaluation Report*, retrieved from: https://www.pca.state.mn.us/sites/default/files/lrp-p2-2sy17.pdf, page 22; *see also* California Department of Toxic Substance Control (n.d.) *Solar Panel FAQs*, retrieved from: https://dtsc.ca.gov/solar-panel-faqs/#easy-faq-348310 (solar panel wastes include heavy metals such as silver, copper, lead, arsenic, cadmium, selenium that at certain levels may be classified as hazardous wastes).

impacts of not addressing roadway deficiencies, such as increased maintenance costs, increased traffic on surrounding roads, and any other associated impacts. For the proposed project, if the commission determines there is no need for additional solar generation, no certificate of need will be issued, and the proposed project will not be constructed. Any impacts associated with the project would not occur.

If the project is not constructed, the potential human and environmental impacts discussed in the following chapter would not occur. Likewise, any potential benefits of the project, such as payments to local units of government would be lost. Not constructing the project would also reduce SES and RES objectives and electricity could be generated from a non-renewable energy source.

Loss of Economic Benefits If the project is not built, economic opportunities would be lost. Landowners would lose the income associated with selling property to the applicant. Local governments would lose energy production tax revenues estimated to be $125,000 annually.[108] The applicant has committed to advertising construction and operation jobs locally, and, as feasible, purchasing goods and services locally. If the project is not constructed, these potential opportunities and their associated income would be lost.

Solar Energy and Renewable Energy Standards Minnesota is committed to meeting SES and RES objectives. While there are solar and wind resources in other parts of the state that could replace the project; these resources are finite. If the project is not built, it would reduce the available options to meet these objectives.

Availability and Feasibility of System Alternatives

Are these system alternatives feasible and available, and, if so, can they meet the stated need for the project?

This section discusses whether system alternatives can be engineered, designed, and constructed; and if alternatives are readily obtainable at the appropriate scale. Constructing these facilities is feasible. Existing facilities are available; however, there may be constraints depending on location.

50 MW Solar Farm

A generic solar farm is both feasible and available; however, a location with sufficient acreage and access to transmission interconnection is necessary.

In the past, access to the electrical grid has constrained wind energy development in Minnesota. This same constraint will likely affect solar energy development. Additionally, Minnesota Rule 7850.4400 states that no large electric power generating plant site (including a solar energy generating system) can include more than one-half acres of prime farmland per MW of net generating capacity. This "prime farmland exclusion" can be waived if "no feasible and prudent alternative" is available or if the commission varies its rules. To date, one utility scale solar project has been sited on prime farmland.[109]

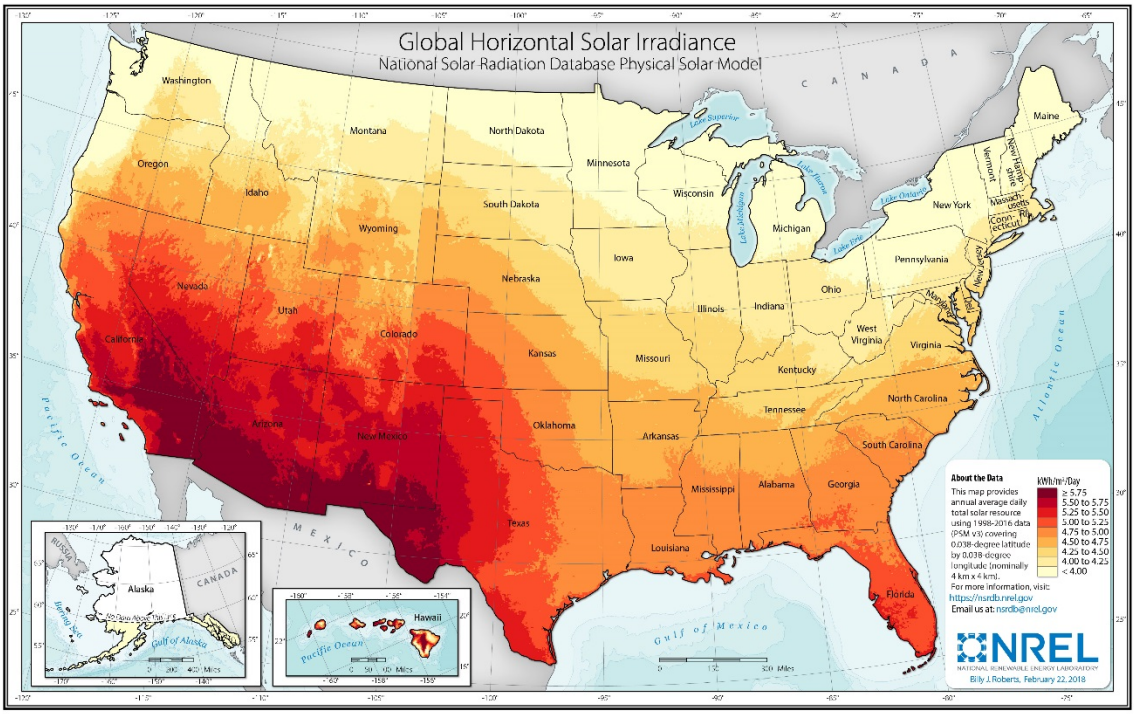
The greater the solar irradiance, which is a measure of both direct and scattered solar radiation, the greater the potential for solar generation. The greatest concentration of solar irradiance in Minnesota

[108] Site Permit Application, P. 48.

[109] Marshall Solar Project (Docket No. IP6941/GS-14-1052).

is concentrated in the southwest area of the state. The solar resource in Minnesota is similar to other states, such as Wisconsin, Michigan, Pennsylvania, and New York (**Error! Reference source not found.**). Solar energy is less efficient in Minnesota than states in the south and west.

Figure 3 Global Horizontal Solar Irradiance: United States

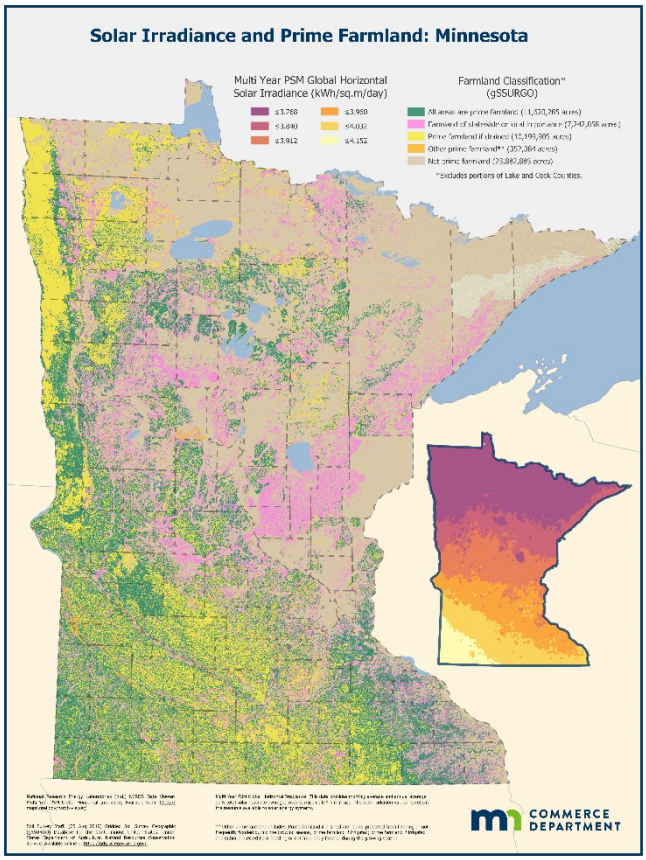


Southwest Minnesota has the greatest solar potential combined with a rural agricultural landscape and low population densities which foster the growth of renewable energy generation. Southern Minnesota is known for its productive farmland, much of it prime farmland (Figure 4). Solar facilities located on prime farmland will require compliance with the prime farmland exclusion. Solar generation will also compete with established wind generation in that part of the state. Solar generation is moving outside of areas traditionally used to generate wind power, for example, the North Star project is a 100 MW solar farm constructed in Chisago County

The U.S. Energy Information Administration projects the levelized total system cost for new generation resources entering service in 2023 to be $48.8 per megawatt hour ("/MWh") ($37.6/MWh with tax credit) for solar PV. Onshore wind continues to be more favorable than solar despite recent decreases in solar generation costs.

Over the past 20 years, generation of electricity in Minnesota has shifted from a reliance on coal and nuclear power to a more diverse mix that includes an increasing amount of renewable generation. Solar generation has increased approximately 2,650 percent since 2015 to 882 MW of installed solar capacity (2018 preliminary data),[110] which accounts for about 2 percent of Minnesota's electrical generation. This increase has been driven by state and federal policies, technology advances, and economics.

Figure 4 Solar Irradiance and Prime farmland



50 MW Wind Farm

A 50 MW wind farm is both feasible and available; however, access to transmission interconnection is necessary for a project to be viable.

Wind resources generally refers to wind availability and wind speeds, which determine the productivity of wind turbines. The Great Plains states, including Minnesota, Iowa, and North and South Dakota, have higher-than-average wind speeds compared to other areas of the country, making wind energy more efficient and inexpensive.

These states also tend to be largely agricultural with lower population densities. Combined, these characteristics—relatively high wind speeds and large areas of available land—have fostered the growth of wind energy generation. However, these characteristics also mean that wind energy is often located far from load centers, requiring transmission lines to transport electricity to populated areas. Electrical energy produced by wind generation is among the lowest-cost energy available to consumers in the United States.

Over the past 20 years, the generation of electricity in Minnesota has shifted from a reliance on coal and nuclear power generation to a more diverse mix that includes an increasing amount of wind generation (wind accounts for approximately 16 percent of electricity generated in Minnesota). Wind generation has increased approximately threefold in the past 10 years to 3,509 MW of installed wind capacity (2016). This increase has been driven by state and federal policies, favorable wind resources, technology improvements, and economics.

[110] *Minnesota Solar Fact Sheet*, https://mn.gov/commerce-stat/pdfs/solar-fact-sheet.pdf .

No-Build Alternative

The no-build alternative does not require any analysis regarding feasibility or availability. If the project were not undertaken, satisfying utilities' and consumers' demands for solar generating capacity would need to be met elsewhere.

Chapter 5: Potential Impacts and Mitigation Measures

Chapter 5 describes the environmental setting, affected resources, and potential impacts. It also discusses mitigation of potential impacts.

How are potential impacts measured?

Potential impacts are measured on a qualitative scale based on an expected impact intensity level; the impact intensity level takes mitigation into account.

A potential impact is the anticipated change to an existing condition caused either directly or indirectly by the construction and operation of a proposed project. Potential impacts can be positive or negative, short- or long-term, and, in certain circumstances, can accumulate incrementally. Impacts vary in duration and size, by resource, and across locations.

Direct impacts are caused by the proposed action and occur at the same time and place. An indirect impact is caused by the proposed action but is further removed in distance or occurs later in time. This EA considers direct and indirect impacts that are reasonably foreseeable, which means a reasonable person would anticipate or predict the impact. Cumulative potential effects are the result of the incremental impacts of the proposed action in addition to other projects in the environmentally relevant area.

Potential Impacts and Mitigation

The following terms and concepts are used to describe and analyze potential impacts:

Duration Impacts vary in length. Short-term impacts are generally associated with construction. Long-term impacts are associated with the operation and usually end with decommissioning and reclamation. Permanent impacts extend beyond the decommissioning stage.

Size Impacts vary in size. To the extent possible, potential impacts are described quantitatively, for example, the number of impacted acres or the percentage of affected individuals in a population.

Uniqueness Resources are different. Common resources occur frequently, while uncommon resources are not ordinarily encountered.

Location Impacts are location dependent. For example, common resources in one location might be uncommon in another.

The context of an impact—in combination with its anticipated on-the-ground effect—is used to determine an impact intensity level, which can range from beneficial to harmful. Impact intensity levels are described using a qualitative scale, which is explained below. These terms are not intended as value judgments, but rather a means to ensure common understanding among readers and to compare potential impacts between alternatives.

Negligible impacts do not alter an existing resource condition or function and are generally not noticeable to an average observer. These short-term impacts affect common resources.

Minimal impacts do not considerably alter an existing resource condition or function. Minimal impacts might, for some resources and at some locations, be noticeable to an average observer. These impacts generally affect common resources over the short- or long-term.

Moderate impacts alter an existing resource condition or function and are generally noticeable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Moderate impacts might be long-term or permanent to common resources, but generally short- to long-term to uncommon resources.

Significant impacts alter an existing resource condition or function to the extent that the resource is impaired or cannot function. Significant impacts are likely noticeable or predictable to the average observer. Impacts might be spread out over a large area making them difficult to observe but can be estimated by modeling. Significant impacts can be of any duration and affect common or uncommon resources.

Also discussed are opportunities to avoid, minimize, or compensate for potential impacts. Collectively, these actions are referred to as mitigation.

To avoid an impact means to eliminate it altogether, for example, by not undertaking parts or all of a project, or relocating the project.

To minimize an impact means to limit its intensity, for example, by reducing project size or moving a portion of the project.

To correct an impact means to repair, rehabilitate, or restore the affected resource.

To compensate for an impact means replacing it or providing a substitute resource elsewhere, or by fixing it by repairing, rehabilitating, or restoring the affected resource. Compensating an impact can be used when an impact cannot be avoided or further minimized.

Some impacts can be avoided or minimized; some might be unavoidable but can be minimized; others might be unavoidable and unable to be minimized, but compensation can be applied. The level at which an impact can be mitigated might change the impact intensity level.

Regions of Influence

Potential impacts to human and environmental resources are analyzed within specific geographic areas called regions of influence ("ROI"). This EA uses the following ROIs:

- local vicinity (1,600 feet from the solar array area and collection line corridor)
- project area (one mile from the boundary)
- Mower County

Impacts to resources may extend beyond these distances but are expected to diminish quickly. ROIs vary between resources. Table 3 summarizes the ROIs used in this EA.

Environmental Setting

The project area is in a rural landscape dominated by agriculture in southeastern Minnesota near the Iowa border. Wooded areas are common around farmsteads. Built features common to the area include residences and buildings, paved and gravel roads, wind turbines, power lines, and substations. The project located is between the towns of Adams and Taopi. State Highway 56 bisects the northern and southern portions of the project.

The DNR and U.S. Forest Service developed the *Ecological Classification System* for ecological mapping and landscape classification in Minnesota. These classifications "identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features."[111] The project is in the Oak Savanna subsection.

Table 3 Regions of Influence for Human and Environmental Resources

Resource Type	Resource Element	Region of Influence
Human Settlement	Displacement, Electrical Interference, Land Use and Zoning	Solar Array Area/ Collection Line Corridor
	Aesthetics, Noise, Property Values, Recreation	Local Vicinity
	Cultural Values	Project Area
	Socioeconomics	Mower County
Public Services	Airports, Roads, Emergency Services, Public Utilities	Project Area
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Worker and Public Safety	Land Control Area/ Collection Line Corridor
Land-based Economies	Agriculture, Forestry, Mining	Land Control Area/ Collection Line Corridor
	Tourism	Project Area
Archaeological and Historic Resources	—	Project Area
Natural Environment	Geology, Soils, Vegetation, Water Resources, Wetlands, Wildlife (except birds), Wildlife Habitat	Land Control Area/ Collection Line Corridor
	Wildlife (birds)	Local Vicinity
	Rare and Unique Resources	Project Area
	Air Quality	Mower County

Pre-settlement vegetation was primarily bur oak savanna, areas of tallgrass prairie and maple-basswood forest were also common. Currently, the predominant land use in this subsection is

[111] Department of Natural Resources (n.d.) *Ecological Classification System: Ecological Land Classification Hierarchy*, retrieved from: https://www.dnr.state.mn.us/ecs/index.html.

agriculture; there are few remnants of pre-settlement vegetation remaining (MNDNR, 2020). The area is generally flat, agricultural land with few wooded areas. The nearest section of the North Branch Upper Iowa River is located one mile away from the North-Eastern boundary of the Project. Unnamed ponds and a drainage system are located between the northern and southern portions of the Project Area.

Project Setting

Land use in the Project Area is characterized as agricultural with more than 96% converted to row crop agriculture. Aside from agricultural fields, the landscape also supports a patchwork of woodlands, wetlands, and drainages. The topography of the Project Area is generally flat with slopes ranging from 1 to 5 percent. The Project Area is surrounded by farmsteads with residences and outbuildings. Most of these farmsteads are at least partially surrounded by woodlands or shelterbelts, which fractionally prevents uninterrupted views of the surrounding landscape.

NLCD is based on a 30-meter resolution meaning cover types are grouped into 30 x 30-meter blocks. This provides an accurate depiction of land cover types at a landscape scale. However, smaller cover types may be classified the same as larger, surrounding cover types. Therefore, when reviewing projects at a localized scale, NLCD may not accurately depict all parcels.

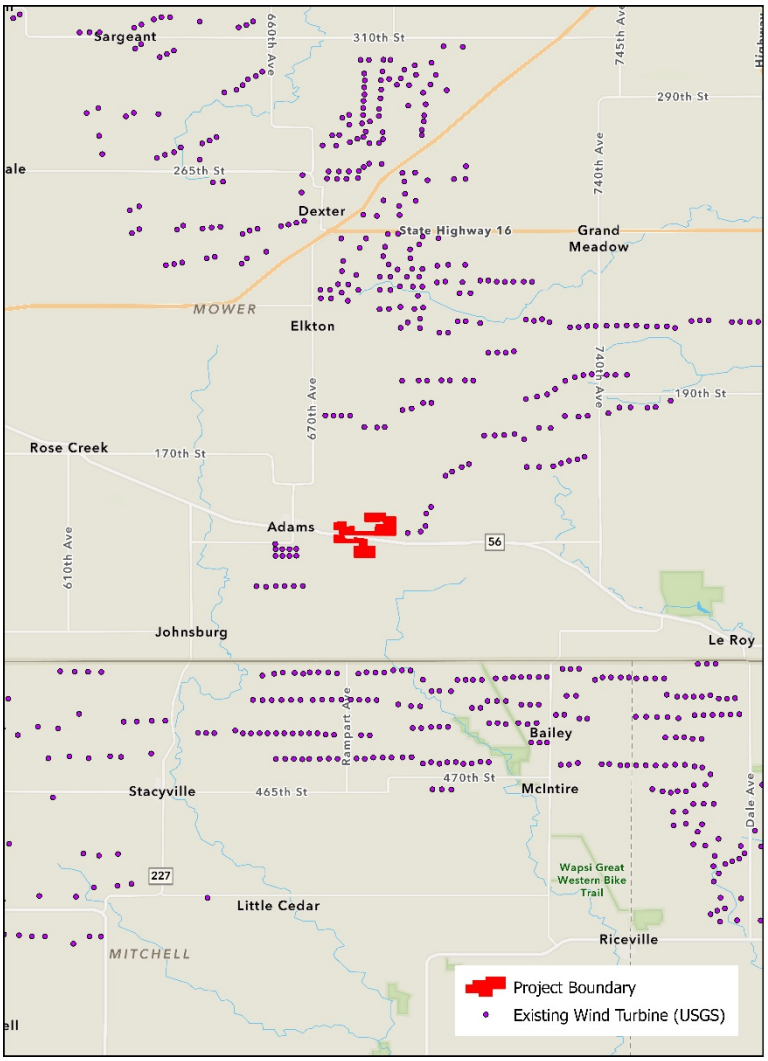
The National Land Cover Database ("NLCD") provides "spatial reference and descriptive data for characteristics of the land surface" nationwide.[112] Land cover types within the project area are predominately agricultural land (96.2 percent), followed by developed (2.2 percent), herbaceous/hay/pasture (1.4 percent), and all other uses (<1 percent). Forested land within the Project Area is predominately comprised of riparian deciduous woodlands areas along streams and wetlands.

State Highway 56 bisects the northern and southern portions of the project. there are multiple transmission lines within or adjacent to the Project Area that interrupt natural agricultural views as shown on Map 7. At least six transmission lines extend south of the Adams Substation with even more to the north. Additional transmission lines run east and west just south of the project area, with other lines transecting the northern portion of the project area. Views in the area are also naturally interrupted by Trunk Highway 56 located between the northern and southern portions of the project, and other county and township roadways. Notable infrastructure on the landscape includes transmission lines, the Adams substation, and surrounding roadways as well as wind turbines at several operating wind farms. Wind farms near the Louise Solar Project include the Mower County Wind Energy Center directly east (0.3-mile), the G. McNeilus Wind Farm immediately southwest (1 mile), and Prairie Star to the north (3.3 miles). Map 3 illustrates wind turbines near the proposed project.

[112] U.S. Geological Survey (February 2012) *The National Land Cover Database*, retrieved from: http://pubs.usgs.gov/fs/2012/3020/fs2012-3020.pdf.

Part of the underground collection system will be horizontally directionally drilled under TH 56 in two separate locations.

Map 3 Wind Turbines near the Proposed Project



Resource Topics Receiving Abbreviated Analysis

Resource topics that will have negligible impacts from the project and that do not impact the Commission's site permit decision receive less study and analysis.

Many environmental factors and associated impacts from a project are analyzed during the environmental review process. However, if impacts are negligible and will not impact the permit decision, those resource impacts receive less study and analysis. The following resource topics meet this threshold, which is based on information provided by the applicant, field visits, scoping comments, environmental analysis, and staff experience with similar projects.

Airports

There is one Federal Aviation Administration (FAA) registered airport located within three nautical miles of the project boundary. Gilgenbach's Private Airport is located 2.25 miles south of the project and operates one turf runway[113]. The project will not impact this airport; therefore, no mitigation is proposed.

Displacement

There are no residences, business, or structures such as barns or sheds located within the project boundary and none will be displaced by the project.[114] No mitigation is proposed.

Electronic Interference

Electronic interference from the proposed project is not anticipated. There are no radio and television towers are located within the project boundary. One communication tower registered with the FAA was identified within one mile of the Project Area. The registered tower is located immediately adjacent to the Adams Substation and is 79 feet tall according to Federal Communications Commission (FCC) records.[115] Section 4.3.14 of the sample permit requires permittees take whatever action is feasible to restore or provide equivalent reception should interference occur to "radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices". Additional mitigation is not proposed.

Emergency Services

Mower County provides police services to the area where the project is proposed, and the Adams Volunteer Fire Department provides fire protection services.[116] The nearest ambulance service is provided by Hazleton General Hospital in Spring Valley, approximately 25 miles northeast of Adams. During construction localized traffic delays could interrupt or delay emergency vehicles. These impacts, should they occur, would be intermittent, temporary, and short-term. Notifying emergency responders of traffic interruptions can mitigate impacts to emergency response. Road mitigations can indirectly mitigate impacts to emergency services. Long-term impacts are not anticipated. No additional mitigation is proposed.

Floodplain

The majority of the project is outside the 500-year and 100-year Federal Emergency Management Agency (FEMA) flood zone.[117] A small portion of the project area in the northwest corner of the project boundary is located withing the 100-year floodplain.[118] According to FEMA, the risk index for Mower County is relatively low.[119]

The project will not significantly impact FEMA-mapped floodplains and no mitigation is proposed. Solar panels have been sited completely outside of mapped FEMA flood zones. Security fencing along

[113] Site Permit Application, P.53.
[114] Site Permit Application, P. 38.
[115] Site Permit Application, P. 41.
[116] Site Permit Application, P. 52.
[117] Site Permit Application, P. 69.
[118] Id.
[119] Federal Emergency Management Agency, National Risk Index Map for Mower County, MN, https://hazards.fema.gov/nri/map.

the north and northwest boundaries of the project area intersect the mapped FEMA floodplain boundary. It is Louise Solar's intent to fully avoid mapped floodplain with security fencing.

Forestry

Active forestry operations, including commercial timber harvest, woodlots, or similar forest resources are not present within the project area or collection line corridor. Tree cover within the project area is associated with undeveloped wetlands and waterways, fence lines, and old shelterbelts adjacent to homesteads. Impacts to forestry will not occur and mitigation is not proposed.

Geology and Topography

The topography of the project area is generally flat with slopes ranging from 1 to 5 percent, with a surface elevation ranging from approximately 1,290 to 1,350 feet.[120] The topography is underlain by surficial glacial and post glacial alluvium deposits, glacial outwash, and till, overlaying sedimentary rock. Impacts to topography and geologic resources are expected to be minimal. Cut and fill grading activities will occur at the solar arrays but is not expected for the collection line. Excavation and blasting of bedrock are not expected. The geotechnical report noted glacial till obstructions such as cobbles and boulders as a potential concern for pile construction, and that foundation type should be carefully evaluated. Construction best management practices, soil separation and decompaction, and restoration of the site with native vegetation after construction will be implemented. Additional mitigation is not proposed.

Implantable Medical Devices

Devices such as pacemakers, defibrillators, neurostimulators and insulin pumps can be susceptible to electronic interference, however only at levels (5 kV/m) that will not exist in the Project Area. Additional mitigation is not proposed.

Stray Voltage

There are two types of stray voltage: induced voltage and neutral-to-earth voltage. Induced voltage is associated with an electric field extending from a transmission line to nearby conductive objects. Neutral-to-earth voltage is a type of stray voltage that can occur where distribution lines enter structures causing extraneous voltage to appear on metal surfaces in buildings, barns, and other structures. The project will not result in the construction of large transmission lines; interconnect to businesses, farms, or residences; or change local electrical service. Impacts are not expected. And mitigation is not proposed.

Wetlands

The applicant conducted a wetland delineation survey within project boundary in November 2020.[121] Eleven wetlands were delineated totaling 6.24 acres.[122] The project is designed to avoid impacts to wetlands. Solar arrays and other project infrastructure will not be located in wetlands. There may be potential for temporary, short-term impacts to wetlands to occur during installation of the electrical collection lines and temporary access roads. Construction BMPS will be followed, including that include temporary construction mats for work in wetlands, directional bores under wetlands, as

[120] Site Permit Application, P. 63.
[121] Appendix K, Wetland Delineation Report.
[122] Site Permit Application, P. 70.

necessary, for the installation of electrical collection lines, and other erosion control measures identified in the MPCA Storm Water Best Management Practices Manual. Section 4.3.5 of the sample permit addresses impacts to wetlands and other water resources. No additional mitigation is proposed.

Human Settlement

Solar farms can impact human settlement. Impacts might be short-term, such as increased local expenditures during construction, or long-term, such as changes to viewshed.

Aesthetics

Individuals will perceive and experience the project differently. For most people, the impact intensity level is expected to be minimal. Portions of the project will be visible from local roads, state highway 56, and some residences. Recreationists on the Shooting Star Trail will also see portions of the project. For individuals with greater viewer sensitivity, the impact intensity level is anticipated to be moderate to significant. Impacts will be short- and long-term, and localized. Potential impacts are unavoidable but can be mitigated in part.

Aesthetics refers to the visual quality of an area as perceived by the viewer and forms the impression a viewer has of an area. Aesthetics are subjective, meaning their relative value depends upon the perception and philosophical or psychological responses unique to individuals. Impacts to aesthetics are equally subjective and depend upon the sensitivity and exposure of an individual. How an individual values aesthetics, as well as perceived impacts to a viewshed, can vary greatly.

A viewshed includes the natural landscape and built features visible from a specific location. Natural landscapes can include wetlands, surface waters, distinctive landforms, and vegetation patterns. Buildings, roads, bridges, and power lines are examples of built features.

Viewer exposure refers to variables associated with observing a viewshed, and can include the number of viewers, frequency and duration of views, and view location. For example, a high exposure viewshed would be observed frequently by large numbers of people. These variables, as well as other factors such as viewing angle or time of day, affect the aesthetic impact.

Potential Impacts

The ROI for aesthetics is the project area. There are no residences or businesses within the project boundary; however, there are eleven residences and several agricultural buildings on parcels adjacent to the project (see Map 1 and Appendix A). Locations where visual impacts will be the greatest are adjacent to residences and along public roadways and trails. The solar arrays will be visible from adjacent roadways, parcels, and state trail. Similar to wind farms, solar arrays may be viewed by some as a disruption to the existing agricultural landscape, and by others as a welcomed complimentary use to farming practices (harvesting solar energy, soil resting and pollinator-friendly habitats). Consequently, aesthetics related to utility-scale solar is largely one of personal perspective and preference. Impacts are unavoidable but can be mitigated in part by vegetative screening.

Because of their relatively low profile, the array will not be visible from great distances. The applicant anticipates that, on average, the PV panels will be 15 feet tall. For reference, center pivot irrigation systems, for corn, are usually 14 to 18 feet in total height, with the sprinkler drop heads between

seven and nine feet tall. The inverter skid sheds would be visible during certain times of day (mid-day), but when the panels are at full tilt, the sheds would likely be obstructed from view. Because PV panels are constructed of dark, light-absorbing material and covered with an anti-reflective coating to limit reflection, glare and reflection are expected to be minor.

The overhead transmission line will be approximately 700 feet long and 80 to 90 feet tall, connecting the project substation to the Adams substation. Operational lighting will be required at gates and perimeter areas as necessary for safety and security. If practicable, lighting will be motion-activated and down lit to minimize impacts and effects.[123] Impacts to light-sensitive land uses are not anticipated given the rural project location coupled with minimal required lighting for operations. Potential impacts will be long-term, but intermittent and minor.

Mitigation

Minimizing aesthetic impacts is primarily accomplished by siting solar facilities consistent with the existing landscape, not immediately adjacent to homes and shielded from view by terrain or existing vegetation. Site-specific landscaping plans can minimize visual impacts to adjacent land uses and homes. Techniques often employed include vegetation screening, berms, or fencing. Adverse impacts can be further mitigated by ensuring that damage to natural landscapes during construction is minimized.

Section 4.3.7 of the sample permit requires permittees to "consider input pertaining to visual impacts from landowners and land management agencies". Specific mitigation at the Platte River crossing is discussed on page 72. No additional mitigation is proposed.

Cultural Values

The impact intensity level is anticipated to be minimal. The project is not anticipated to impact or alter the work and leisure pursuits of residents or land use in such a way as to impact the underlying culture of the area.

Cultural values include those perceived community beliefs or attitudes, which provide a framework for community. Cultural values can also include ethnic heritage. According to the U.S. Census Bureau (2010), the population of Mower County derives from a mostly European heritage accounting for approximately 80% of the population, followed by 11% Hispanic, and 9% African American, Native American and Asian American.[124] The region surrounding the Project has cultural values tied to the area's German, English, and Native American heritage, and the agricultural economy. Cultural representation in community events appears to be tied to geographic features (such as nearby lakes), seasonal events, national holidays, and municipal events as well as ethnic heritage.[125] Construction of the proposed project is not expected to conflict with the cultural values and heritage of the area.

Potential Impacts

The ROI for cultural values is the project area. The project contributes to the growth of renewable energy and is likely to strengthen and reinforce this value, especially in an area that already has wind farms. Development of the project will change the character of the area potentially changing residents' sense of place. There are tradeoffs for rural communities between renewable energy

[123] Site Permit Application, P. 44.
[124] Route Permit Application, P. 50.
[125] Route Permit Application, P. 51.

projects and retaining the rural character of an area. Construction and operation of the project is not anticipated to impact or alter the work and leisure pursuits of residents in the project area or land use in such a way as to impact the underlying culture of the area.

Mitigation

There are no conditions included in the sample permit that directly address mitigation for impacts to cultural values. No mitigation is proposed.

Land Use and Zoning

The impact intensity level is anticipated to be moderate. Potential impacts to zoning are anticipated to be long-term and localized. Constructing the project will change land use from agricultural to solar energy production for a minimum of 30 years. After the project's useful life, the land control area could be restored to agricultural or other planned land uses by implementing appropriate restoration measures. Impacts can be minimized.

Land use is the characterization of land based on what can be built on it and how the land is used. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to guide specific land uses within specific geographic areas. Land cover documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types, including wetlands.[126] Solar farms may alter current and future land use and land cover.

A site permit from the commission supersedes local zoning, building, or land use rules.[127] Though zoning and land use rules are superseded, the commission's site permit decision must be guided, in part, by consideration of impacts to local zoning and land use in accordance with the legislative goal to "minimize human settlement and other land use conflicts."[128]

The project area is zoned agricultural. Mower County's Zoning Ordinance outlines standards for large solar farms and solar facilities. Solar Farms "are allowed in the Agricultural and Rural Management Districts of Mower County by Conditional Use Permit."[129] However, because the Project requires a Site Permit from the State of Minnesota, a site permit from the PUC supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances put in place by regional, county, local and special purpose governments. The PUC will take local land use into consideration when reviewing the project record. The project meets county standards where feasible and the applicant continues to work with Mower County.[130]

Potential Impacts

The ROI for land use and zoning is the project boundary. Constructing the project will change land use from agricultural to solar producing for at least 30 years. After the project's useful life, the project area could be restored to agricultural or other planned land uses by implementing appropriate

[126] National Oceanic and Atmospheric Administration, U.S. Department of Commerce, https://oceanservice.noaa.gov/facts/lclu.html . Accessed August 2021.

[127] Minn. Stat. 216E.10, subd. 1.

[128] Minn. Stat. 216E.03, subd. 7.

[129] Mower County Zoning Ordinance, 2003. Section 14-18.7, Special Conditions for Solar Farms and Gardens, https://www.co.mower.mn.us/DocumentCenter/View/1168/Mower-County-Zoning-Ordinance-PDF Accessed August, 2021.

[130] Site Permit Application, P. 24, and P. 55.

restoration measures. The project will not impact growth future growth areas identified in the Mower County Comprehensive Plan.

Mitigation

The project is designed to largely accommodate local zoning and landuse planning. Normal agricultural activities can continue within the project area not converted to solar panels, access roads, transmission, and fencing. The project will not preclude current or planned land use on adjacent parcels. Upon decommissioning and removal of the project, the affected parcels may be returned to the existing agricultural use or transitioned to other planned land uses.

Noise

Specific impacts are associated with construction and operation of the proposed project. The impact intensity level during construction will range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts may affect nearby residences and might exceed state noise standards. Impacts are unavoidable but can be minimized. Operational impacts are anticipated to be negligible.

Noise can be defined as any undesired sound.[131] It is measured in units of decibels on a logarithmic scale. The A-weighted scale ("dBA") is used to duplicate the sensitivity of the human ear.[132] A three dBA change in sound is barely detectable to average human hearing, whereas a five dBA change is clearly noticeable. A 10 dBA change is perceived as a sound doubling in loudness. Noise perception is dependent on a number of factors, including wind speed, wind direction, humidity, and natural and built features between the noise source and the receptor. Figure 5 provides decibel levels for common indoor and outdoor activities.[133]

Noise standards in Minnesota are based on *noise area classifications* ("NAC"), which correspond to the location of the listener, referred to as a receptor. NACs are assigned to areas based on the type of land use activity occurring at that location. Household units, designated camping and picnicking areas, resorts and group camps are assigned to NAC 1; recreational activities (except designated camping and picnicking areas) and parks are assigned to NAC 2; agricultural and related activities are assigned to NAC 3. A complete list is available at Minnesota Rule 7030.0050.

Noise standards are expressed as a range of permissible dBA over a one-hour period. There is no limit to the maximum loudness of a noise.[134] Table 4 provides current Minnesota noise standards.
The project is in a rural area. "Quiet daytime noise levels in rural areas with no significant noise sources might be in the 30 to 40 dBA range."[135] Noise levels increase sporadically with passing vehicle

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[131] Pollution Control Agency (n.d.) *Noise Pollution*, retrieved from: https://www.pca.state.mn.us/air/noise-pollution.

[132] Pollution Control Agency (November 2015) *A Guide to Noise Control in Minnesota*, retrieved from: https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.

[133] Federal Aviation Administration (February 9, 2018) *Fundamentals of Noise and Sound*, retrieved from: https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/.

[134] *Id*., page 2.

[135] Federal Highway Administration (August 7, 2018) *Techniques for Reviewing Noise Analyses and Associated Noise Reports*, retrieved from: https://www.fhwa.dot.gov/Environment/noise/resources/reviewing_noise_analysis/#toc494123468.

traffic; high winds; or use of farm equipment, all-terrain vehicles, or snowmobiles. The primary noise receptors within the local vicinity are residences, farmsteads, and the Blazing Star State Trail.

Table 4 Noise Area Classifications (dBA)

Noise Area Classification	Daytime (7:00 a.m. to 10:00 p.m.)		Nighttime (10:00 p.m. to 7:00 a.m.)	
	L_{10}	L_{50}	L_{10}	L_{50}
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

Potential Impacts

The ROI for noise is the local vicinity. Specific impacts are associated with both construction and operation; however, impacts are primarily associated with construction.

Construction Noise from construction will be temporary in duration, limited to daytime hours and potentially moderate to significant depending in location. Sound levels from grading equipment are not dissimilar from the typical tractors and larger trucks used in agricultural communities during harvest. Pile driving will be the most significant source of construction noise at roughly 101 dBA at 50 feet.[136] The noise from construction activities would dissipate with distance and be audible at varying decibels, depending on the locations of the equipment and receptor. The average distance from area homes to the proposed solar arrays is roughly 700 feet, with the nearest receptor 206 feet. Because construction activities will be sequenced, multiple construction activities will occur at the same time but in different locations. occurring at some array locations and pile driving at others. Noise levels will return to background levels of 40 dBA during the day and 34 dBA at night once construction is completed. Figure 5 illustrates common indoor and outdoor noise levels.

Figure 5 Comparative Noise Levels

Operation Noise levels during operation of the project are anticipated to be negligible. The primary source of noise will be from inverters, transformers, and the project substation. Noise levels are expected to be constant throughout the day and lower during non-daylight hours. The applicant's

[136] Site Permit Application, P. 40.

preliminary design meets the nighttime L_{50} dBA noise standard.[137] Noise from routine maintenance activities is anticipated to be negligible to minimal. Noise from the electrical collection system, collection line, and gen-tie transmission line is not expected to be perceptible.

Noise levels modeled at the receptors were at or below the ANSI s12.3/Part 3 Category 6: Very Quiet Rural Residential with a typical daytime ambient noise level of approximately 40.0 dBA. Receptors G, H, and I, were modeled with impacts above the established ambient levels of 1.5 dBA, 8.5 dBA, and 0.5 dBA, respectively. However, these levels were not significant enough to create a noise environment over 40 dBA during the day and 34 dBA at night, well within the state's noise standards of 60 and 50 dBA. On average, homes are more than 700 feet away from the proposed arrays. During construction, the applicant plans to limit construction to daylight hours. Equipment used for construction will be in good working condition and properly muffled to reduce sound generation to the greatest extent practicable.

Mitigation

Sound control devices on vehicles and equipment, for example, mufflers; conducting construction activities during daylight hours, and, to the greatest extent possible, during normal business hours; and running vehicles and equipment only when necessary are common ways to mitigate noise impacts. Impacts to state noise standards can be mitigated by timing restrictions. Section 4.3.6 of the sample permit requires that "construction and maintenance activities shall be limited to daytime working hours to the extent practicable to ensure nighttime noise level standards will not be exceeded". During operation, permittees are required to adhere to noise standards at all times and all appropriate locations. No additional mitigation is proposed.

Property Values

Impacts to property values within the local vicinity could occur; however, changes to a specific property's value are difficult to determine. Impacts in the local vicinity are anticipated to be minimal. Impacts to specific properties could be moderate to significant. Long-term impacts may or may not occur. Potential impacts can be minimized.

Impacts to property values can be measured in three ways: sale price, sales volume, and marketing time. These measures are influenced by a complex interaction of factors. Many of these factors are parcel specific, and can include condition, size, acreage, improvements, and neighborhood characteristics; the proximity to schools, parks, and other amenities; and the presence of existing infrastructure, for example, highways or transmission lines. In addition to property-specific factors, local and national market trends, as well as interest rates, can affect all three measures. The presence of a solar farm becomes one of many interacting factors that could affect a specific property's value.

A literature review did not identify peer-reviewed journal articles quantifying impacts to property values based solely on proximity to utility-scale solar farms. However, comparably sized solar farms exist in Minnesota, and limited sales information is available. The 100 MW North Star Solar project located in Chisago County covers 800 acres. Chisago County found that between January 2016 and October 2017 the median ratio between sales price and assessed value of homes near the North Star project was 87.8 percent—this includes properties surrounded by the solar array. This ratio is comparable with Sunrise and North Branch Townships, which had median ratios of 88.2 percent and

[137] Site Permit Application, P. 41.

85.6 percent, respectively.[138] Home sales exceeded assessed value near the solar farm at a rate comparable to the general real estate market in the area.

Potential Impacts

The ROI for property values is the local vicinity. Impacts to property values within the local vicinity could occur; however, changes to a specific property's value are difficult to determine. Negative impacts to property values are not anticipated. Impacts in the local vicinity are anticipated to be minimal. Impacts to specific properties could be moderate to significant.

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts and encumbrances to future land use. Impacts can also be mitigated through individual agreements with neighboring landowners. Such agreements are not within the scope of this EA.

Recreation

During construction the impact intensity level is anticipated to be moderate to significant. Potential impacts will be intermittent and occur over the short-term. These localized impacts will affect the Shooting Star State Trail. Impacts can be minimized or avoided. Operational impacts will be long-term, unavoidable, and subjective to the individual.

The project is within 108 feet of the Shooting Star State trail.[139] The trail is located on an old railroad right-of-way, and provides biking, running, and walking opportunities for area residents. The trail is paved between LeRoy and Austin. A portion of nearby snowmobile track 176 is located about 0.5 miles from the project boundary. State Highway 56 is a designated State Scenic Byway and was one of the first wildflower routes in the state.[140] It is 31 miles long and located between I-90 and Hwy 63 near the Iowa border.

Potential Impacts

The ROI for recreation is the local vicinity. During construction the impact intensity level is anticipated to be moderate to significant. Potential impacts will be intermittent and occur over the short-term. Impacts can be minimized or avoided. Operational impacts, such as changes to the viewshed, will be long-term and subjective to the individual.

Significant noise impacts during construction are anticipated. Operational noise will be negligible and will not affect recreationists. Fugitive dust associated with construction might indirectly impact recreationalists. New built features will be introduced to the landscape, and construction equipment and vehicle traffic will affect aesthetics.

Impacts will occur and may temporarily interrupt recreational activities on the Shooting Star State Trail while deliveries are made to the southern portion of the site at the intersection of Highway 56

[138] Kurt Schneider, Environmental Services Director, Chisago County Environmental Services and Zoning (October 20, 2017) *Email to EERA staff*.

[139] Site Permit Application, P. 51.

[140] Minnesota Department of Transportation, Scenic Byways, http://www.dot.state.mn.us/scenicbyways/. Accessed August 2021.

and 680th Avenue. If trail use is interrupted, it is anticipated to be temporary and short in duration. The applicant will coordinate with DNR staff if the trail is closed for any length of time.[141]

Mitigation

No significant impacts to recreational opportunities are anticipated and therefore no mitigation measures are proposed.

Socioeconomics

Effects associated with construction will, overall, be short-term and minimal. Significant positive effects may occur for individuals. Impacts from operation will be long-term and significant. Adverse impacts are not anticipated.

Mower County is a part of the Minnesota Department of Employment and Economic Development Region 10, which is in the Southeast Planning Region. The county has seen a slight increase in population since 2010. However, the region continues to suffer from a shortage of workers, slowing economic growth .[142] In 2020, Mower County had a lower unemployment rate (4.7%) than the state average (6.2%).[143] In 2019, Mower County had a lower median household income ($54,295) than the state ($68, 411), and a higher percentage of households with incomes below $50,000.[144]

The applicant anticipates the project to generate around $125,000 of property tax annually.[145] It is also expected to support 350-400 jobs during the construction and installation phases, and up to 21 indirect and 2 full time permanent jobs during the operations phase.[146] Indirect economic benefits will occur from additional local spending on goods and services and local sales tax. Adverse impacts associated with the loss of agricultural land and agricultural production will be mitigated through lease payments to landowners. Table 6 provides a snapshot of Mower County's socio-economic profile compared to the state of Minnesota.

Figure 6 Population and Economic Profile

Location	Total Population	Percent Minority Population‡	Median Household Income	Percent Below Poverty Level
Minnesota	5,490,726	16.3	$ 65,699	10.5
Mower County	39,807	8.1	$ 54,295	14.1

* Source: U.S. Census Bureau, 2019 American Community Survey Estimates

‡ Minority population includes all persons excluding those who self-identified as white.

[141] Site Permit Application, P. 52.
[142] Minnesota Department of Employment and Economic Development County Profile for Mower County, https://mn.gov/deed/assets/2021_EDR10RP_MS_tcm1045-133258.pdf .Accessed August 2021.
[143] Id.
[144] Id.
[145] Site Permit Application, P. 48.
[146] Id.

Potential Impacts

The ROI for socioeconomics is Mower County. The impact intensity level is anticipated to be positive. Potential impacts associated with construction will be positive, but minimal and short-term. Significant positive effects might occur for individuals. Impacts from operation will be long-term, positive, and moderate. The project will not disrupt local communities or businesses and does not disproportionately impact low-income or minority populations (see discussion of environmental justice on P 78). Adverse impacts are not anticipated.

Positive economic impacts include increased expenditures, for example, food and fuel, at local businesses during construction. The applicant indicates that some materials might be purchased locally depending on availability, terms, and conditions, etc. The applicant anticipates an average of 100 workers at the site during construction. During peak construction periods up to 150 workers might be employed. The applicant has committed to posting jobs locally. However, "[t]he experience and training requirements for [renewable energy production] workers vary widely: from positions that require specialized skills, years of experience, and a license or certification; to jobs that can be filled by individuals with little or no construction experience."[147] From the U.S. Bureau of Labor Statistics:

> *The majority of the occupations [related to the project] are not specific to the solar industry—they exist in other industries as well. Although many of these occupations require special skills unique to solar power, skills can be acquired in other industries in most cases. For many positions, experience in other industries is desired by employers in the solar power industry. For example, solar photovoltaic installers need to have specialized knowledge and training, but many installers have previous experience as roofers, electricians, or construction workers*.[148]

Because experience requirements "vary widely" it is difficult to predict how many jobs may or may not be local jobs.

The applicant will pay property tax and production taxes on the land and energy production to local governments. Property taxes are calculated on the land underlying the facility—personal property consisting of solar energy generating systems is exempt meaning the value of the generation equipment is not included in the calculation.[149] Instead of paying personal property tax on the generation equipment, Minnesota adopted a production tax of $1.20/MWh paid 80 percent to counties and 20 percent to the cities and townships.150 Louise solar estimates the project will provide annual production tax revenues to Mower County of approximately $105,000-$115,000 annually over 35 years or longer. Additionally, Lodi and Adams Townships will receive approximately $25,000-$30,000 annually over 35 years. In addition, lease and purchase payments paid to the landowners will offset potential financial losses associated with removing a portion of their land from agricultural production.[151]

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[147] Lucas Franco (August 2019) *Catching the Wind 2.0: An Update on Changing Employment Practices in Minnesota's Wind Energy Industry*, retrieved from: https://www.localjobsnorth.org/wind-energy-overview, page 16.

[148] U.S. Bureau of Labor Statistics (n.d.) *Careers in Solar Power*, retrieved from: https://www.bls.gov/green/solar_power/.

[149] Minn. Stat. 272.02, subdivision 24.

[150] *See* Minnesota Statutes, Section 272.0295.

[151] *Application for a Certificate of Need*, P. 17.

Mitigation

Socioeconomic impacts are anticipated to be positive. Section 8.5 of the sample permit requires quarterly reports concerning efforts to hire Minnesota workers. Section 9 addresses project decommission, specifically requiring the permittee to file a decommissioning plan with the commission prior to operation; establishing the permittee as the responsible party for carrying out decommissioning tasks, and sets out minimum standards for restoration and timelines; and addresses abandoned solar installations. No additional mitigation is proposed.

Human Health and Safety

Construction and operation of a solar farm has the potential to impact human health and safety.

Electronic and Magnetic Fields

The impact intensity level is anticipated to be negligible and is not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized.

EMFs are invisible forces that result from the presence of electricity. They occur naturally and are caused by weather or the geomagnetic field. They are also caused by all electrical devices and found wherever people use electricity. EMFs are characterized and distinguished by their frequency, that is, the rate at which the field changes direction each second. Electrical lines in the United States have a frequency of 60 cycles per second or 60 hertz, which is extremely low frequency EMF ("ELF-EMF"). The strength of an electric field decreases rapidly as it travels from the conductor and is easily shielded or weakened by most objects and materials.

In 2002, the Minnesota State Interagency Working Group on EMF Issues, comprised of staff from state agencies, boards, and commission, was tasked to study issues related to EMF. The group published *A White Paper on Electric and Magnetic Field Policy and Mitigation Options*, and concluded the following:

> Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF…. However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship…, nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.

The Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk cannot be dismissed.[152] Table 5 provides electric and magnetic field strength of common household items.

[152] State of Minnesota, State Interagency Working Group on EMF Issues (2002) *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*, retrieved from: http://www.capx2020.com/Images/EMFWhitePaper2002.pdf.

Table 5 Electric and Magnetic Field Strength of Common Household Items

Electric Field*		Magnetic Field**			
Appliance	kV/m	Appliance	mG		
	1 foot		1 inch	1 foot	3 feet
Stereo	0.18	Circular saw	2,100 to 10,000	9 to 210	0.2 to 10
Iron	0.12	Drill	4,000 to 8,000	22 to 31	0.8 to 2
Refrigerator	0.12	Microwave	750 to 2,000	40 to 80	3 to 8
Mixer	0.10	Blender	200 to 1,200	5.2 to 17	0.3 to 1.1
Toaster	0.08	Toaster	70 to 150	0.6 to 7	< 0.1 to 0.11
Hair Dryer	0.08	Hair dryer	60 to 200	< 0.1 to 1.5	< 0.1
Television	0.06	Television	25 to 500	0.4 to 20	< 0.1 to 1.5
Vacuum	0.05	Coffee maker	15 to 250	0.9 to 1.2	< 0.1

* German Federal Office for Radiation Safety
** Long Island Power Institute

Regulations and Guidelines Currently, there are no federal regulations regarding allowable ELF-EMF produced by power lines in the United States; however, state governments have developed state-specific regulations. The commission limits the maximum electric field under high voltage transmission lines in Minnesota to 8.0 kV/m.[153] It has not adopted a standard for magnetic fields.

Potential Impacts

The ROI for EMF is the land control area. Potential impacts are anticipated to be negligible and are not expected to negatively affect human health. Impacts will be long-term and localized but can be minimized.

The primary sources of EMF from the Project will be from buried electrical collection lines, the gen-tie transmission line and from the transformers installed at each inverter. EMF from electrical collection lines, transmission lines, and transformers dissipates rapidly with distance from the source. The internationally accepted guideline for general public exposure to electric fields is 4.2 kV/m and 833 milliGauss (mG) for magnetic fields (NIEHS, 2002).

The project includes a 700-1,000-foot long 161 kV overhead gen-tie transmission line running from the project substation to the Adams Substation. Several evaluations have concluded that transmission lines of a similar voltage are unlikely to have EMF impacts. As an example, evaluations were conducted on the North Star Solar Project's 115 kV transmission line in Chisago County. The maximum electric field associated with that transmission line measured at one meter above ground was calculated to be 0.739 kV/m, dissipating to 0.188 at 50 feet. The peak magnetic field directly below the transmission line was calculated to be 42.47 mG one meter above ground, dissipating to 14.7 mG at 50 feet. Additionally, the NIEHS reports electric fields directly below a 161 kV transmission line to be 1.0 kV/m,

[153] *E.g.*, Department of Commerce (May 14, 2018) *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project,* retrieved from: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf, page 13.

dissipating to 0.5 kV/m at 50 feet. Similarly, average magnetic fields directly below the transmission line were reported at 29.7 mG before dissipating to 6.5 mG at 50 feet (NIEHS, 2002). The levels generated by the proposed Project 161 kV transmission line are anticipated to be similar, and well below the internationally accepted guideline for general public exposure.[154]

Mitigation

No health impacts from EMF are anticipated. EMFs from underground electrical collection and feeder lines dissipate very quickly and relatively close to the source because they are installed below ground to a depth of approximately 48 inches and are heavily insulated and shielded. Consequently, the electrical fields that emanate from buried lines and transformers are generally considered negligible, and magnetic fields often decrease significantly within approximately three feet of stronger EMF sources (such as transmission lines and transformers). No additional mitigation is proposed.

Worker and Public Safety

The impact intensity level is minimal. Potential impacts would be short-and long-term and can be minimized. Worker safety issues are primarily associated with construction.

The project substation, collection line, and gen-tie line will be designed and constructed in compliance with applicable electric codes. Electrical inspections will ensure proper installation of all components, and the project will undergo routine inspection. Electrical work will be completed by trained technicians. Fencing will deter public access, and signage will provide appropriate public warnings.

In Minnesota, solar panels discarded by commercial entities must be assumed to be hazardous waste due to the probable presence of heavy metals, unless they are specifically evaluated as non-hazardous. Heavy metals in solar panels can include arsenic, cadmium, lead, and selenium. If hazardous waste, they must be properly disposed of in a special facility or recycled if recyclers are available.[155]

Potential Impacts

The ROI for worker and public safety is the land control area. Worker safety issues are primarily associated with construction. Public safety concerns would be most associated with unauthorized entry to the project.

Like any construction project, there are risks. These include potential injury from falls, equipment and vehicle use, electrical accidents, etc. Construction might disturb existing environmental hazards on-site, for example, contaminated soils. A review of *What's in My Neighborhood*, maintained by MPCA, indicates that potentially contaminated sites do not occur within the land control area.[156]

During operation there are occupational risks similar to those associated with construction. Public risks would result from unauthorized entry into the facility.

[154] Site Permit Application, P. 37.
[155] *Supra* Chapter 3, note 107.
[156] Pollution Control Agency (August 2021) *What's in My Neighborhood*, retrieved from: https://www.pca.state.mn.us/data/whats-my-neighborhood.

Mitigation

Construction is bound by federal and state Occupational Safety and Health Administration requirements for worker safety,[157] and must comply with local, state, and federal regulations regarding installation of the facilities. Established industry safety procedures will be followed during and after construction of the project. Crews will be trained and briefed on safety issues, reducing the risk of injury. The project will be fenced to prevent unauthorized access A decommissioning plan addresses PV panel end of life issues.

Section 4.3.19 of the sample permit addresses public safety, including landowner educational materials, appropriate signs and gates, etc. Section 8.10 requires permittees file an emergency response plan with the commission prior to operation. Section 8.11 requires disclosure of extraordinary events, such as fires, etc. No additional mitigation is proposed.

Public Services

Large energy projects can impact public services, such as buried utilities or roads. These impacts are usually temporary, for example, road congestion associated with material deliveries. Impacts can be long-term if they change the area in a way that precludes or limits public services.

Roads and Highways

Potential impacts associated with construction are anticipated to be short-term, intermittent, and localized. The impact intensity level is expected to be minimal to moderate. During operation, no impacts to roads are anticipated; negligible traffic increases would occur for maintenance. Impacts are unavoidable but can be minimized.

Access to the project will be via existing township, county, or state roads. The major roadway in the area is State Highway 56, which bisects the proposed project. Other roads that surround the Project Area are local county or township roads. The project is bordered on the north by 150th Street and 690th Avenue to the west.

There will be several access points to the Project. The northern units of the Project will be accessed from 150th Street and 690th Avenue, and the Applicant will likely seek driveway access from State Highway 56. Access from State Highway 56 is not currently being contemplated for the southern portions of the Project; access to the southern arrays will likely be from 140th and 680th Streets. Louise Solar may utilize the existing driveway to the ITC Adams substation (from State Highway 56) for access to the Project substation.

Potential Impacts

The ROI for roads and highways is the project area. The impact intensity level will be minimal. Potential impacts associated with construction are anticipated to be short-term, intermittent, and localized. Major delivery access to the project will be from the public road network via State Highway 56. Traffic during construction is estimated to be approximately 50-100 pickup trucks, cars, and/or other types of employee vehicles onsite during construction. Approximately 10-20 semi-trucks per day will be used for delivery of facility components. Since the area roadways have AADTs that are well below capacity, this increased traffic may be perceptible to area residents, but the slight increase in

[157] U.S. Department of Labor (n.d.) *Occupational Safety and Health Administration*, retrieved from: https://www.osha.gov/.

volume is not expected to affect traffic function. Slow-moving construction vehicles may also cause delays on smaller roads, similar to the impact of farm equipment during planting or harvest. However, these delays should be minimal for the relatively short construction delivery period. Overweight or oversized loads are not anticipated.

No impacts to roads are anticipated during the operation; negligible traffic increases would occur for maintenance.

Mitigation

Section 4.3.12 of the sample permit addresses roads. Permittees are required to inform road authorities of roads that will be used during construction and acquire necessary permits and approvals for oversize and overweight loads. Permitted fencing and vegetative screening cannot interfere with road maintenance activities, and the least number of access roads shall be constructed. Additionally, the following practices can mitigate potential impacts:

- Pilot vehicles can accompany movement of heavy equipment.
- Deliveries can be timed to avoid traffic congestion and dangerous situations on the roadway.
- Traffic control barriers and warning devices can be used as necessary.
- Temporary guard structures should be used to support the conductor above vehicle traffic if necessary, to string collection lines over the roadway.
- Photographs can be taken prior to construction to identify pre-existing conditions. Permittees would be required to repair any damaged roads to preconstruction conditions.

Utilities

The impact intensity level is anticipated to be minimal. Impacts should be limited to an electrical outage during interconnection of the project to the Adams substation. Potential impacts can be minimized.

Utilities within the project area are typical of rural areas across central Minnesota. The project area is not serviced by city water supply or sanitary sewer. There are no wells within the project boundary.[158] There are numerous distribution lines and high voltage transmission lines throughout the local vicinity. A natural gas pipeline is located immediately southwest of the Project Area. Another gas line runs east to west through the northern portion of the project.

Potential Impacts

The ROI for utilities is the project area. The impact intensity level is anticipated to be minimal. Impacts will be limited to a single electrical outage. Potential impacts can be minimized.

The applicant will coordinate with Gopher State One Call before and during construction to avoid impacts to pipelines and other underground utilities. The applicant will also conduct an American Land Title Association survey to identify underground utilities.[159] Final design will minimize and avoid impacts to underground and overhead utilities; if conflicts are unavoidable Louise Solar will coordinate with the utility to develop an approach to protect the utility.[160] Underground utilities will be marked prior to construction start.

[158] Site Permit Application, P. 52.
[159] Site Permit Application, P.53.
[160] Id.

Limited, temporary impacts to service may occur during interconnection of the project substation via the short 161kV transmission line to the Adams Substation. These outages are anticipated to be of short duration and closely coordinated with utilities and landowners.

Mitigation

Potential impacts can be avoided by marking underground utilities prior to construction and avoiding these areas during construction. The location of underground utilities can be identified using the Gopher State One Call system during engineering surveys. If a utility is identified, the project component or the utility itself might need to be relocated if it cannot be successfully crossed. Relocation, as well as any necessary crossing, would need to be coordinated with the affected utility.

Electrical outages can be minimized by using the minimum number necessary and informing customers of the outage well in advance. Additionally, necessary transmission outages should be coordinated through Midcontinent Independent System Operators.

Section 4.3.4 of the sample permit requires permittees to minimize disruptions to public utilities. No long-term impacts to utilities will occur. Additional mitigation is not proposed.

Land-based Economies

Solar farms impact land-based economies by precluding or limiting land use for other purposes.

Agriculture

The impact intensity level will range from moderate to significant. Impacts will be localized and unavoidable but can be minimized through mitigation.

Agricultural use encompasses more than 90 percent of the project area, with corn and soybean as the dominant crops. According to the U.S. Department of Agriculture's (USDA's) 2017 Census of Agriculture, of the 455,680 acres that comprise Mower County, approximately 447,193 acres are cropland.[161] A total of 1,068 individual farms are located in Mower County, with the average farm size at 419 acres. The top crops (in acres) include corn, soybeans, and other vegetables harvested for sale, with some livestock. The 2017 market value of agricultural production in Mower County was approximately $413 million. Livestock, poultry, and their products accounted for approximately 41 percent of the total value of agricultural production, while crop sales accounted for the remaining 59 percent. [162]

Prime Farmland as defined by Federal regulation at 7 C.F.R. 657.5(a)(1) "is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." Ninety-eight percent of the soils in Mower County are classified as prime farmland or prime farmland if drained.[163] Nearly all the project area is located on

[161] USDA. 2017. 2017 Census of Agriculture, County Profile. Available at https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Minnesota/cp27099.pdf. Accessed September 2020.

[162] Id.

[163] Site Permit Application, Appendix C Agricultural Impact Mitigation Plan, P. 9.

prime farmland/prime farmland if drained. Table 11 shows prime farmland classifications within the project boundary.

Table 11 Prime Farmland Classifications within the Project Boundary

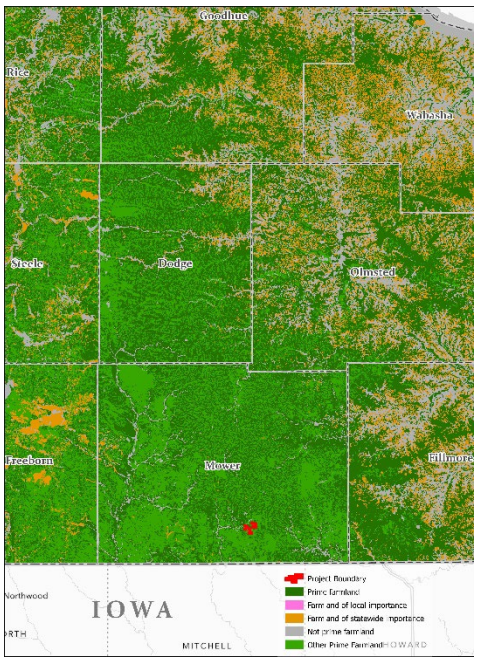
Farmland Classification	Area (Acreage)	Percent of Project Area
Prime Farmland	149.2	46.0
Prime Farmland if Drained	165.1	50.9
Not Prime Farmland	10.3	3.2
Total	**324.6**	**100**

Potential Impacts

The ROI for agriculture is the land control area. The impact intensity level will range from moderate to significant. The intensity of the impact is likely to be subjective. For example, conversion of farmland to energy production can be viewed as a conversion from one type of industrial use to another. Conversely, the conversion of farmland to energy production can be viewed as a negative impact to agricultural production. Restoring the site with native grasses and forbs will reduce soil erosion, provide pollinator and wildlife benefits, and improve soil health. This EA acknowledges that the perceived impacts to prime farmland are subjective and may be difficult to assess given the trade-offs associated with utility scale solar projects.

Rural areas, with large parcels of relatively flat, open land, are ideal for solar development, which require six to eight acres of land to generate one MW of electricity. The project will result in up to 325 acres of farmland being removed from agricultural production for the life of the project. This change in land use would take productive farmland out of production but would result in a negligible loss of farmland in Mower County. The applicant indicates that the land could be returned to agricultural uses after the project is decommissioned and the site is restored.[164]

[164] See *Agricultural Impact Mitigation Plan*.



Minnesota Rule 7850.4400 states that no large electric power generating plant site (including a solar energy generating system) can include more than one-half acres of prime farmland per MW of net generating capacity. This prime farmland exclusion can be waived if "no feasible and prudent alternative" is available or if the commission varies its rules. The applicant conducted a screening analysis to assess whether the project meets the "feasible and prudent alternative" threshold. The analysis looked at factors such as high solar resource areas, interconnect locations, and open farmland, focusing on the southern portion of the state. Within this area, the applicant screened for substations and transmission lines with available capacity, leading to a relatively narrow subset of possible points of interconnection (POI) with low or no network upgrade requirements.[165] Financial constraints further focused on potential locations within 3 miles of the identified POIs which had to meet the following criteria: "cleared and otherwise undeveloped, not currently encumbered by other easements (wind farms, etc.), contained minimal wetlands, streams, transmission lines, pipelines, roads, or other obstacles that would limit the buildable land or lead to irregularly shaped development areas."[166] Once potential sites were identified, the applicant approached landowners for voluntary leases and easements.

The project site was selected due to its proximity to the POI, supportive landowners, and no competition with other potential renewable energy projects in the area. There are several wind developments in this area, which limits siting options while remaining close to the Adams Substation.

Mitigation

Reduced or lost farming revenues may be offset by leasing agreements, which are outside the scope of this document. The applicant developed and is committed to an *Agricultural Mitigation Plan* that details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would allow the land to be returned to agricultural use.[167]

The applicant committed to "gather additional information about the existence of drain tile from landowners and other data sources, possibly including, but not limited to, infrared aerial photographs. In the event that damage occurs to drain tile or private ditches as a result of construction activities or operation of the [project, the applicant] will repair any damages."[168] The applicant also commits to assuring that restoration is conducted in a manner that allows "land surfaces to drain properly, blend with the natural terrain, re-vegetate, and avoid erosion."[169]

[165] Site Permit Application. P. 12.
[166] Id.
[167] See *Agricultural Impact Mitigation Plan*, Appendix C of the Site Permit Application.
[168] Revised Site Permit Application, page 52.
[169] *Id.*, page 51.

Section 4.3.18 of the sample permit requires permittees fairly restore or compensate landowners for damages to crops, fences, drain tile, etc. during construction. Other sections address impacts to soils, such as erosion, compaction, etc. No additional mitigation is proposed.

Mining

There will be no impacts to mining and no mitigation is proposed.

There are no mines located within the project boundary. There are 3 inactive gravel pits located within one mile of the project boundary.[170] No other mining resources were identified on or near the Project Area.

Potential Impacts

The ROI for mining is the project area and collection line corridor. Impacts are not anticipated.

Mitigation

There will be no impacts to mining and mitigation is not proposed.

Tourism

The project will have a negligible impact on tourism in the area or Mower County. Impacts would be temporary and of short duration.

In 2019 the leisure and hospitality industry in Mower County accounted for about $60 million in gross sales, and 1,222 private sector jobs.[171] Electrical infrastructure can impact tourism if they affect visitor experiences at tourism sites, primarily through aesthetic or noise impacts, or degrade natural or human-made resources that provide tourist-type activities.

Potential Impacts

The ROI for is the project area. The impact intensity level is anticipated to be minimal to moderate during construction. Impacts will be localized. Impacts will be unavoidable, but minimal during operation. Construction noise related impacts would be short-term and intermittent and range from negligible to significant. Operational noise is expected to be below ambient noise levels. Aesthetic impacts would be subjective to the individual.

Mitigation

Impacts to tourism can be mitigated by selecting locations that avoid natural and human-made resources utilized for tourist-type activities. Potential impacts to tourism can also be mitigated by reducing noise and aesthetic impacts, as well as impacts to natural landscapes. Long-term impacts can be mitigated through appropriate screening. Mitigation specific to the Two Rivers campground was recommended on page 51. Various sections of the sample permit indirectly address impacts to recreation, such as noise, aesthetics, soils, etc., and, as a result, indirectly mitigate impacts to tourism. No additional mitigation is proposed.

[170] Site Permit Application, P. 60.

[171] Explore Minnesota (n.d.) *Tourism and Minnesota's Economy*, retrieved from: https://mn.gov/tourism-industry/research/tourism-and-the-economy.jsp.

Archeological and Historic Resources

The impact intensity level is anticipated to be negligible to minimal. Impacts would be localized. Impacts can be mitigated through siting and routing.

Archeological resources are locations where objects or other evidence of archaeological interest exist, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[172] Historic resources are sites, buildings, structures, or other antiquities of state or national significance.[173]

Potential Impacts

No previously recorded archaeological or historic sites will be directly impacted by the proposed Project. A Phase I archaeological survey of the project area and vicinity, including the short transmission line route, was completed in October 2020, and no archaeological sites were identified.[174]

The applicant also reached out to the eleven Minnesota Tribal Nations' Tribal Historic Preservation Officers and the Minnesota Indian Affairs Council for additional information or comment on the project. Prior to construction, the applicant will prepare an Unanticipated Discoveries Plan outlining steps to be taken if previously unrecorded cultural resources or human remains are encountered during construction.[175]

Mitigation

Prudent siting and routing can avoid impacts to archaeological and historic resources. This is the preferred mitigation. Section 4.3.13 of the sample permit addresses archeological resources.[176] If previously unidentified archaeological sites are found during construction, the applicant would be required to stop construction and contact SHPO to determine how best to proceed.[177] Ground disturbing activity will stop and local law enforcement will be notified should human remains be discovered.[178] Because impacts to archeological and historic resources are not anticipated, additional mitigation is not proposed.

Natural Resources

Solar farms impact the natural environment. Impacts are dependent upon many factors, such as how the project is designed, constructed, maintained, and decommissioned. Other factors, for example, the environmental setting, influence potential impacts. Impacts can and do vary significantly both within, and across, projects.

[172] *See* Minn. Stat. 138.31, subd. 14.
[173] *See* Minn. Stat. 138.51.
[174] See *Phase I Archaeology Report*, Appendix J of the Site Permit Application.
[175] Site Permit Application, P. 61.
[176] Appendix C.
[177] *Ibid*.
[178] *Ibid*.

Air Quality

The impact intensity level is anticipated to be minimal. Intermittent localized impacts will occur during construction. Once operational, the solar array will not generate criteria pollutants or carbon dioxide. Impacts related to operation of the collection line are anticipated to be long-term, localized, and negligible. Impacts are unavoidable and do not affect a unique resource. Impacts can be minimized.

The nearest air quality monitor to the project is in Rochester, Minnesota. Air quality in the area has been considered "good" from 2015-2019. The largest number of days classified as moderate occurred in 2018, with a couple days each in 2015 and 2016 where air quality was considered unhealthy for sensitive groups, with zero days classified as unhealthy or very unhealthy. [179]

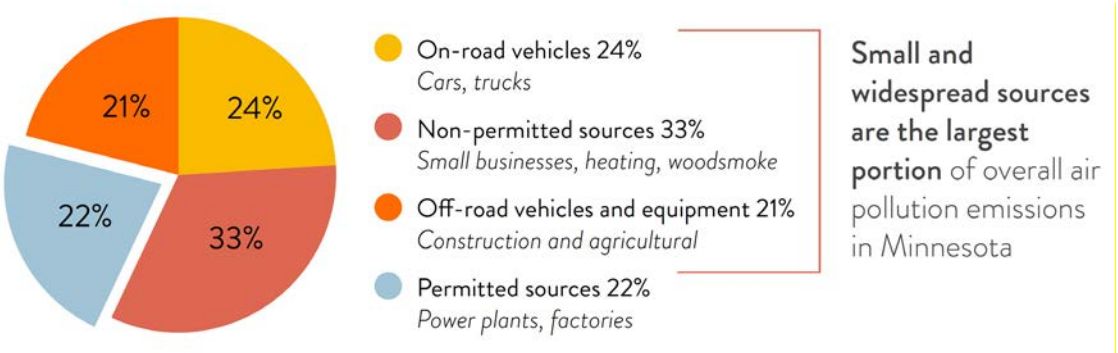
Potential Impacts

The ROI for air quality is Mower County. During construction, minimal intermittent air emissions are expected. Air emissions associated with construction are highly dependent upon weather conditions and the specific activity occurring. For example, traveling to a construction site on a dry gravel road will result in more fugitive dust than traveling the same road when wet. Once operational, the solar array would not generate criteria pollutants or carbon dioxide.

Motorized equipment will emit exhaust. This includes construction equipment and vehicles travelling to and from the project. Exhaust emissions, primarily from diesel equipment, would vary according to the phase of construction.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions.[180] The project will generate fugitive dust from travel on unpaved roads, grading, and excavation. "The impact of a fugitive dust source on air pollution depends on the quantity and drift potential of the dust particles injected into the atmosphere. In addition to large dust particles that settle out near the source (often creating a local nuisance problem), considerable amounts of fine particles also are emitted and dispersed over much greater distances from the source."[181]

Table 6 Air Pollution Sources by Type



[179] Site Permit Application, P. 62.

[180] U.S. Environmental Protection Agency (January 1995) *Compilation of Air Pollutant Emissions Factors: Western Surface Coal Mining*, retrieved from: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors, section 11.9

[181] *Id.*, section 13.2

Power lines produce ozone and nitrous oxide through the corona effect—the ionization of air molecules surrounding the conductor. Ozone production from a conductor is proportional to temperature and sunlight and inversely proportional to humidity. These compounds contribute to smog and adverse health effects.[182] Minnesota has an ozone standard of 70 parts per billion (ppb) measured over a daily eight-hour average of the three-year average of the annual fourth-highest daily maximum.[183] The national ozone standard is 0.070 ppm over a 3-year average of the annual fourth-highest daily maximum eight-hour average concentration.[184] Ozone and nitrous oxide emissions are anticipated to be well below these limits.

Emissions associated with maintenance are dependent upon weather conditions and the specific activity occurring. The applicant indicates that, over the life of the project, fugitive dust emissions will be reduced by the elimination of farming and establishment of permanent vegetative cover.

Mitigation

Exhaust emissions can be minimized by keeping vehicles and equipment in good working order, and not running equipment unless necessary.

Watering exposed surfaces, covering disturbed areas, and reducing speed limits on-site are all standard construction practices.

The *Agricultural Impact Mitigation Plan* and *Vegetation Management Plan* list best management practices, that while directly related to soils and vegetation, will help to mitigate against fugitive dust emissions. Several sections of the sample permit indirectly mitigate impacts to air quality, including sections related to soils, vegetation removal, restoration, and pollution and hazardous wastes.

Groundwater

The impact intensity level is anticipated to be minimal. Localized impacts would be intermittent with the potential to occur over the long-term. Impacts can be mitigated.

The Project is within the South-Central Province, which is characterized by "thick clayey glacial drift with limited extent sand aquifers overlying Paleozoic sandstone, limestone, and dolostone aquifers."[185] In this province, groundwater is typically derived from sedimentary bedrock aquifers.

Wellhead protection areas (WHPA) exist "to prevent contamination of public drinking water supplies by identifying water supply recharge areas and implementing management practices for potential pollution sources found within those areas."[186] There are no wellhead protection areas within the land

[182] U.S. Environmental Protection Agency (August 27, 2020) *Ozone Pollution*, retrieved from: https://www.epa.gov/ozone-pollution.

[183] Minn. R. 7009.0080.

[184] U.S. Environmental Protection Agency (December 20, 2016) *National Ambient Air Quality Standards (NAAQS) Table*, retrieved from: https://www.epa.gov/criteria-air-pollutants/naaqs-table.

[185] MNDNR. 2001. Groundwater Provinces. Available online at https://www.dnr.state.mn.us/groundwater/provinces/index.html. Accessed August 2021.

[186] Pollution Control Agency (n.d.) *Wellhead and Source Water Protection Programs*, retrieved from: https://www.pca.state.mn.us/water/wellhead-and-source-water-protection-programs.

control area, with the nearest WHPA located in the town of Adams, approximately 0.9 miles west of the Project Area.[187]

"The *Minnesota Well Index* provides basic information about location, depth, geology, construction and static water level, for many wells and borings drilled in Minnesota. It by no means contains information for all the wells and borings and the absence of information about a well on a property does not mean there are not wells on that property."[188] There are no wells located withing the project boundary. Although no wells are identified within the Project Area, if one is discovered that was not mapped on available mapping resources, Louise Solar will assess whether the well is open and cap it, if necessary, in accordance with Minnesota Department of Health requirements.[189]

Potential Impacts

The ROI for groundwater is the project area and collection line corridor. No impacts to groundwater area anticipated. Impacts can be mitigated.

Potential impacts to groundwater can occur directly or indirectly. Direct impacts are generally associated with construction, for example, driving galvanized steel i-beam post foundations could penetrate shallow water tables. Although there is potential that subsurface activity might disturb shallow groundwater resources, the disturbance area would be well above well-depth used for potable water in the local vicinity.

Collection line structures will be embedded directly into the ground. Some of these structures might come into direct contact with groundwater. Wood preservatives might reach groundwater from direct contact or from the soil through runoff and leaching. Generally, leaching is greatest in the first year.[190] If concrete foundations are used some portion of the soluble components of the cement paste might leach into groundwater prior to the setting and hardening of the concrete. This will change the pH of groundwater around the surface of the concrete but should not extend far from the foundation.[191]

Impacts to surface waters can lead to indirect impacts to groundwater. Surface water impacts are not anticipated.

Mitigation

Section 4.3.3 of the sample permit requires permittees to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]". MPCA has indicated that soil testing to "ensure existing soil infiltration rates do not exceed 8.3 inches per hour" will be required as part the application for a CSW Permit.[192] Impacts to groundwater can also be minimized by mitigating impacts to surface waters and soils. Additional mitigation is not proposed.

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[187] Site Permit Application, P.66.

[188] Department of Health (n.d.) *Minnesota Well Index*, retrieved from: https://apps.health.state.mn.us/cwi/#.

[189] Id.

[190] *E.g.*, Department of Commerce (May 14, 2018) *Potential Human and Environmental Impacts of the Freeborn Wind Transmission Line Project,* retrieved from: https://mn.gov/eera/web/project-file?legacyPath=/opt/documents/34748/1%20Text%20Figures%20Tables.pdf, pages 64-66.

[191] *Id.*, pages 66-67.

[192] *Ibid*.

Rare and Unique Resources

The impact intensity level is anticipated to be minimal. Impacts could be positive or negative, short- and long-term. Impacts can be mitigated.

The Minnesota DNR classifies rare plant or animal communities across the state. These include Scientific and Natural Areas, High Conservation Value Forest, Minnesota Biological Survey ("MBS") Native Plant Communities, and MBS Sites of Biodiversity Significance. No rare plant or animal communities have been identified within the project boundary.

The Division of Ecological and Water Resources within DNR manages the Natural Heritage Information System ("NHIS"), "provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. 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. Its purpose is to foster better understanding and conservation of these features."[193]

NHIS data includes federally endangered, threatened, or candidate plant species, and endangered or threatened animal species. The system also includes state endangered, threatened, or special concern species. The NHIS database a source of information, but not the sole source for identifying these resources, as some areas surveys have not been conducted extensively or recently making.

The Northern Long Eared Bat (NLEB) is a federally listed species and state listed species of concern. This species hibernates in caves and mines from November-March. In the spring and summer, this species roosts in tree cavities, crevices, or sloughing bark.[194] Foraging occurs in forested areas or edge habitats. There are no documented occurrences of NLEB in the project boundary or within one mile of the project.

Prairie Bush Clover is a federally and state listed threatened species endemic to tall grass prairies of the upper Mississippi River Valley.[195] Remaining occurrences of the species are generally restricted to remnant prairies.[196] The primary threat to the species is habitat loss and destruction. There are no documented occurrences of this species in the project boundary or within one mile of the project.

Wild quinine is a state endangered species found in prairies, fields, open wooded areas, rocky forests and hillsides, with dry, well-drained soils.[197] Minnesota is the northwest tip of its habitat range and is usually only found in protected railroad rights-of-way, and prairie and savanna remnants in southeast Minnesota. There are no documented occurrences within the project boundary, however it has been documented within one mile of the project.

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[193] Department of Natural Resources (n.d.) *Natural Heritage Information System*, retrieved from: http://www.dnr.state.mn.us/nhnrp/nhis.html (because our information is not based on a comprehensive inventory, there are rare or otherwise significant natural features in the state that are not represented in the database).

[194] Site Permit Application, P. 75.

[195] Site Permit Application, P. 76.

[196] Id.

[197] Id.

Potential Impacts

The ROI for rare and unique species is the project area. Rare plant and animal communities do not occur in the land control area. Northern long-eared bats may be present in the project area but given the lack of hibernacula and limited tree cover, it is unlikely. The project area is primarily agricultural land with no remnant prairie or existing prairie habitat. There are no known occurrences of prairie bush clover in the project area. Construction and operation of the project will not impact wild quinine.

Mitigation

Any tree removal should avoid the active season for the Northern long-eared bat (April 1-September 30).[198] Ensuring construction and operation are consistent with USFWS guidance would minimize impacts to this species. Techniques for minimizing impacts to wildlife and vegetation also minimize impacts to rare species. No additional mitigation is proposed.

Soils

Impacts to soils will occur during construction and decommissioning of the project. Impacts are expected to be temporary and minor. Potentials impacts will be positive and negative, and short- and long-term.

The soils deposited in the area are characteristic of glacial and post glacial activity and are listed in Table 8. Soils on the site are classified as predominantly low to moderate for erodibility. Soils listed as predominantly hydric or all hydric are scattered throughout the Project location. Wetlands are associated with some of these areas, however other areas appear to be effectively drained by agricultural practices.[199] Of the soils in the Project Area, 96 percent are classified into prime farmland or prime farmland if drained.[200]

Table 7 Soil Types within Project Boundary

Soil Type	Acres	Drainage Class	Hydric
Pits, sand and gravel	4.2	Excessivelydrained	Non-hydric
Anthroportic Udorthents, 2to 9 percent slopes	0.8	Moderately welldrained	Non-hydric
Donnan silt loam	6.2	Somewhat poorly drained	PredominantlyNon-hydric

[198] This would also mitigate impacts to nesting birds.
[199] Site Permit Application, Pp. 64-65.
[200] See Agricultural Impact Mitigation Plan, Appendix C of the Site Plan, P. 13.

Hayfield loam, loamysubstratum	1.0	Somewhat poorly drained	Non-hydric
Stateline silt loam	13.7	Poorly drained	PredominantlyHydric
Hayfield loam	6.2	Somewhat poorly drained	PredominantlyNon-hydric
Udolpho silt loam, loamysubstratum	6.6	Poorly drained	PredominantlyHydric
Coland, frequently flooded-Spillville, occasionally flooded complex, 0 to 2 percent slopes	1.4	Poorly drained	Partially Hydric
Skyberg silt loam, 0 to 3percent slopes	117.1	Somewhat poorly drained	PredominantlyNon-hydric
Lilah sandy loam, 0 to 2percent slopes	8.4	Excessivelydrained	PredominantlyNon-hydric
Lilah sandy loam, 2 to 6percent slopes	2.1	Excessivelydrained	Non-hydric
Kasson silt loam, 1 to 4percent slopes	4.4	Moderately welldrained	PredominantlyNon-hydric
Ostrander loam, 0 to 2percent slopes	6.9	Well drained	Non-hydric
Ostrander loam, 2 to 5percent slopes	7.5	Well drained	Non-hydric
Sargeant silt loam	8.1	Poorly drained	PredominantlyHydric
Vlasaty silt loam, 1 to 4percent slopes	4.4	Moderately welldrained	PredominantlyNon-hydric
Floyd silt loam, 1 to 4percent slopes	21.6	Somewhat poorly drained	PredominantlyNon-hydric
Waukee loam, 2 to 5 percentslopes	11.9	Well drained	Non-hydric
Lawler silt loam	28.2	Somewhat poorly drained	PredominantlyNon-hydric
Dowagiac loam, 2 to 6 percent slopes	4.8	Well drained	Predominantly Non-hydric
Shandep clay loam	0.1	Very poorly drained	All Hydric
Oran silt loam, 1 to 4 percent slopes	44.6	Somewhat poorly drained	Predominantly Non-hydric
Protivin silt loam	91.3	Somewhat poorly drained	Non-hydric
Billett fine sandy loam, 2 to 6 percent slopes	6.9	Well drained	Predominantly Non-hydric
Clyde silty clay loam, 0 to 3 percent slopes	33.1	Poorly drained	Predominantly Hydric
Readlyn silt loam, 1 to 3 percent slopes	33.1	Somewhat poorly drained	Predominantly Non-hydric
Tripoli clay loam, 0 to 2 percent slopes	138.8	Poorly drained	Predominantly Hydric

Potential Impacts

The ROI for soils is the land control area. The impact intensity level is expected to be low-moderate. Primary impacts to soils include compaction from construction equipment, soil profile mixing during grading and pole auguring, rutting from tire traffic, drainage interruptions, and soil erosion Potentials impacts will be positive and negative, and short- and long-term. Isolated moderate to significant negative impacts associated with high rainfall events could occur. Impacts to soils are greatest with the below-ground electrical collection system.

Construction will disturb approximately 325 acres within the land control area.[201] Of this, about 104 acres will be graded, which consists of cutting and filling earth in targeted areas to provide a level and stable base the solar panels.[202] Topsoil is 12 inches or more in depth on the site .Grading and excavating will separate the first 12 inches of topsoil, which will stored on site and replaced when construction is completed.[203] As with any ground disturbance, there is potential for soil compaction and erosion. Should high rainfall events occur during construction or prior to establishment of permanent vegetation, significant sedimentation and erosion could occur.

Soil cover and management will change from cultivated cropland to a mixture of impervious surfaces, for example, PV panels, access roads, project substation, etc., underlain and surrounded by native groundcover plantings. Once permanent vegetation is properly established, stormwater management, as well as general soil health, might improve due to use of native plants. The location and amount of topsoil will be documented to facilitate re-spreading of topsoil after decommissioning.[204] These benefits could extend beyond the life of the project if they are preserved through decommissioning practices, and if the site is returned to agricultural use.

The type of electrical collection system used will impact soils differently. In all systems, some trenching will be required to bury electrical cables. Impacts are most substantial with the below-ground system due to trenching.

Mitigation

Impacts to soils would be temporary and minor and mitigated through the proper use and installation of BMPs such as using soil ripping equipment to decompact soils following construction, separating and stockpiling topsoil for later spreading and seeding to prevent topsoil mixing with subsoils, halting construction during wet weather conditions to prevent soil rutting from equipment tires, and avoiding and repairing drain tiles to maintain proper site drainage.[205] Louise Solar will also develop a Stormwater Pollution Prevention Plan (SWPPP) that complies with Minnesota Pollution Control Agency rules and guidelines. Implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction.[206]

[201] Site Permit Application, P. 56.
[202] Site Permit Application, P. 59.
[203] See Agricultural Impact Mitigation Plan, Appendix C of the Site Permit Application, P. 18.
[204] Id.
[205] Site Permit Application, Pp. 59-60.
[206] Id.

Sections 4.3.1, 4.3.2, 4.3.3, and 4.3.8 of the sample permit address soil related impacts: 4.3.1 requires protection and segregation of topsoil; 4.3.2 requires measures to minimize soil compaction; and 4.3.3 requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." A CSW Permit requires both temporary and permanent stormwater controls. Section 4.3.3 also requires implementation of reasonable erosion and sediment control measures, contours graded to provide for proper drainage, and all disturbed areas be returned to pre-construction conditions. Section 4.3.8 requires that "site restoration and management" practices enhance "soil water retention and reduces storm water runoff and erosion".

The applicant developed and is committed to an *Agricultural Impact Mitigation Plan* (AIMP) which details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.[207] The *Vegetation Management Plan* defines how the project area will be revegetated and monitored over the life of the project. Appropriate seeding rates and timing of revegetation will stabilize soils and improve overall soil health.[208]

Surface Water

The impact intensity level is anticipated to be minimal. Direct impacts to surface waters are not expected. Indirect impacts to surface waters might occur. These impacts will be short-term, of a small size, and localized. Impact can be mitigated.

The project is located in the Cedar River Watershed Basin.[209] One unnamed MNDNR Public Watercourse is located in the northwest corner of the project area and is classified a natural perennial watercourse.[210] No other rivers, streams or lakes are mapped within the project area.

Public Waters

Certain waters in Minnesota are classified as public waters under Minnesota Statute 103G.005. Public waters are wetlands, water basins, and watercourses of significant recreational or natural resource value in Minnesota. A public waters designation means that DNR has regulatory jurisdiction over the use of the water, meaning lake, watercourse, or wetland. Utilities are required to obtain a license to cross state lands and waters.[211] Projects affecting the course, current, or cross-section of lakes, wetlands, and streams that are public waters may require a Public Waters Work Permit.[212]

A full jurisdictional waters field delineation of the project area was conducted the week of November 2, 2020.[213] No rivers or lakes were identified as part of the field delineation. Portions of three streams/waterways were delineated as described in Table 23. One delineated stream in the

[207] See *Agricultural Impact Mitigation Plan*, Appendix C of the Site Permit Application.

[208] See *Vegetation Establishment and Monitoring Plan*, Appendix D of the Site Permit Application.

[209] Minnesota Pollution Control Agency, https://www.pca.state.mn.us/water/watersheds/cedar-river . Accessed August 2021.

[210] Site Permit Application, P. 68.

[211] Minn. Stat. 84.415.

[212] Minnesota Department of Natural Resources (n.d.) *Requirements for Projects Involving Public Waters Work Permits*, retrieved from: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/requirements.html.

[213] Site Permit Application, P. 69.

northwest portion of the project area is associated with an unnamed DNR Public Watercourse. Other surface water resources within a mile of the Project include one MNDNR Public Watercourse located to the southwest.

Table 8 **Field Delineated Watercourses**

Watercourse ID	Field Delineated Watercourse Type	Watercourse Size (Ac.) (within project area)	Mapped Type
WC-01	Ephemeral	0.23	R4SBC
WC-02	Intermittent	1.34	R4SBC
WC-03	Perennial	0.27	R2UBH

Potential Impacts

The ROI for surface waters is the land control. The project will not directly impact surface waters. Wet sedimentation basins are proposed where infiltration and filtration basins are not allowed due to soil conditions and/or water table elevation. These basins will provide rate control and treatment as needed to meet MPCA requirements.[214]

Mitigation

Standard construction management practices, including, but not limited to containment of excavated soils, protection of exposed soils, stabilization of restored soils, and controlling fugitive dust, would minimize the potential for eroded soils to reach surface waters.

Section 4.3.3 of the sample site permit requires "reasonable measures to minimize erosion and sedimentation during construction" such as use of perimeter sediment controls and controlling vehicle tracking. Section 4.3.3 also requires the permittee to "implement erosion prevention and sediment control practices recommended by the [MPCA]" and to "obtain a [CSW Permit]." Depending on total impervious surface associated with the project, the CSW Permit will address mitigation for operational stormwater impacts. No additional mitigation is proposed.

Vegetation

Within the project area, the impact intensity level is anticipated to be long-term and positive. Minimal negative impacts would occur along the collection line. Additional mitigation is proposed.

Pre-European settlement vegetation was dominated by bur oak (*Quercus macrocarpa*) savanna interspersed with tallgrass prairies and maple (*Acer* spp.) -basswood (*Tilia* spp.) forests.[215] Current land-use in the project area is predominately agricultural.

Potential Impacts

The ROI for vegetation is the land control area. Conversion of existing vegetation will be limited as most of the land within the project area is tilled on an annual basis for row crops. Agricultural land

[214] Site Permit Application, P. 70.

[215] Minnesota Department of Natural Resources (MNDNR). Undated. Ecological Classification System. Available online at https://www.dnr.state.mn.us/ecs/index.html. Accessed August 2021.

within the solar array area will be seeded with herbaceous vegetation except for the substation, inverter skids, and access roads, which will be converted to developed land and impervious surfaces.[216] The project will avoid tree clearing to the extent practicable. Low growing native seed mixes developed in cooperation with DNR will be used to seed the site. Once established, vegetation will be maintained by mowing.

Construction activities could introduce invasive species and the early phases of site restoration and seeding of native species can result in populations of non-native and invasive species on site. Any non-native and invasive species will be monitored and treated as described in the *Vegetation Establishment and Monitoring Plan*.[217]

Mitigation

The applicant prepared and is committed to a *Vegetation Establishment and Management Plan* to guide site preparation, installation of prescribed seed mixes, management of invasive species and noxious weeds, and control of erosion/sedimentation. The applicant developed and is committed to an *Agricultural Impact Mitigation Plan* that details methods to minimize soil compaction, preserve topsoil, and establish and maintain appropriate vegetation to ensure the project is designed, constructed, operated and ultimately restored in a manner that would preserve soils to allow for the land to be returned to agricultural use.

Section 4.3.7 of the sample permit requires that vegetation clearing be limited to only the extent necessary for construction access and safe operation and maintenance of the project. Section 4.3.8 requires that site restoration and management practices provide for native perennial vegetation and the development of Vegetation Monitoring Plan. Section 4.3.9 discusses pesticide use. Section 4.3.10 requires permittees to employ best management practices to avoid the potential introduction and spread of invasive species on lands disturbed by project construction. Section 4.3.11 requires permittees to take all reasonable precautions against the spread of noxious weeds during all phases of construction.

Any revisions to the *Vegetation Establishment and Management Plan* must be done in coordination MDNR, BWSR, MDA, and Commerce. The vegetation management plan and documentation of the coordination efforts between the permittee and the coordinating agencies shall be filed at least 14 days prior to the preconstruction meeting. The final *Vegetation Establishment and Management Plan* has not yet been submitted for approval by the agencies listed above.

Wildlife and Habitat

Potential impacts may be positive or negative and are species dependent. Long-term, minimal positive impacts to birds, small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur to individuals during construction and operation of the project. Once restored, the land control area will provide native grassland habitat for the life of the project. The project does not contribute to significant habitat loss or degradation or create new habitat edge effects. Potential impacts can be mitigated in part. The impact intensity level is expected to be minimal.

[216] Site Permit Application, P. 72.

[217] See *Vegetation Establishment and Monitoring Plan*, Appendix D of the Site Permit Application.

Landscape types and vegetation communities vary throughout the local vicinity. Fencerows and woodlots, as well as small grassland pockets, provide habitat for terrestrial and avian wildlife.

Wildlife utilizing the land control area are common species associated with disturbed habitats and are accustom to human activities occurring in the area, for example, agricultural activities and road traffic. Mammals, reptiles, amphibians, and insects are present. These species include white-tailed deer, red fox, striped skunk, wild turkey, ringnecked pheasant, sandhill crane, passerines, rodents, gartersnake, gopher snake, and insects.[218] Due to the lack of water resources in the project area and vicinity, waterfowl are not common in the area.

"Minnesota defines Species in Greatest Conservation Need ("SGCN") as native animals, nongame and game, whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability. Also included are species for which Minnesota has a stewardship responsibility."[219] The Wildlife Action Network is "mapped terrestrial and aquatic habitats, buffers, and connectors that represent a diversity of quality habitat . . . representing viable or persistent populations and 'richness hotspots' of SGCN".[220]

The project rea is also located within the Eastern Tallgrass Prairie Bird Conservation Region (BCR).[221] The USFWS identified 39 species of birds within Eastern Tallgrass Prairie BCR as Birds of Conservation Concern (BCC); BCC are avian species representing the agency's highest conservation priorities and are considered to be at risk of becoming candidates for listing under the federal Endangered Species Act (ESA) without conservation efforts. Some of the BCC in the Eastern Tallgrass Prairie BCR include the bald eagle, American bittern (*Botaurus lentiginosus*), black rail (*Botaurus lentiginosus*), upland sandpiper (*Bartramia longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), black-billed cuckoo (*Coccyzus erythropthalmus*), blue-winged warbler (*Vermivora cyanoptera*), grasshopper sparrow (*Ammodramus savannarum*), and dickcissel (*Spiza americana*).[222]

Potential Impacts

The ROI for wildlife and wildlife habitat is the project boundary and collection line corridor. The ROI for birds is the local vicinity. The impact intensity level is expected to be minimal. Impacts could be positive or negative and depend on species type. Potential impacts will be short- and long-term and can be mitigated.

Wildlife Individuals will be displaced to adjacent habitats during construction. Because the land control area does not provide important habitat, this should not impact life cycle functions, for

[218] Site Permit Application, Pp. 73-74.

[219] Department of Natural Resources (2016) *Minnesota's Wildlife Action Plan 2015 – 2025*, retrieved from: https://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/mnwap/wildlife-action-plan-2015-2025.pdf, page 15.

[220] Department of Natural Resources (April 13, 2016) *The Wildlife Action Network developed for the 2015-2025 MN Wildlife Action Plan*, retrieved from: https://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/mnwap/mndnr_wildlife_action_network_description.pdf.

[221] Site Permit Application, P. 75.

[222] Id.

example, nesting. Direct significant impacts to individuals might occur, that is, small species might be crushed or otherwise killed during construction. Population level impacts are not anticipated.

The single largest impact to wildlife associated with the project is fencing. Studies estimate that one ungulate per year becomes entangled for every two and one-half miles of fence.[223] Deer can jump many fences, "but smooth or barbed-wire can snag animals and tangle legs, especially if wires are loose and spaced too closely together" (**Error! Reference source not found.**).[224] Predators can use fences to corner and kill prey species.[225] Bird injuries or mortality occurs from fencing "due to lack of visibility"—raptors in pursuit of prey "are particularly vulnerable to the nearly invisible wire strands".[226] Other low flying birds such as grouse and owls are also vulnerable to fence collisions.

Fencing that successfully excludes deer would, as a result, funnel deer along roads that bisect or follow the periphery of the project increasing risk of deer mortality—as well as increased risk of human injury—associated with deer vehicle collisions.[227]
Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact wildlife populations. Wildlife entanglement and death from plastic netting and other plastic materials has been documented in birds, fish, mammals, and reptiles.[228]

Risks to birds have been identified near PV solar farms.[229] PV panels are "movable and generally directed upward, reflecting the sky". "[A] large expanse of reflective, blue panels may be reminiscent of a large body of water." Preliminary findings, based on limited data, suspect the danger is this appearance of water causing migrating birds to attempt to land, consequently incurring trauma and related predation.

Reduced pesticide use, as compared to agricultural production, should benefit insects, including pollinators, and smaller wildlife such as rodents, birds, insects, and reptiles. Revegetating the site with pollinator friendly species will also benefit these species.

Habitat There are no DNR Wildlife Management Areas, Aquatic Management Areas, Sites of Biodiversity Significance, or Scientific and Natural Areas; or USFWS Waterfowl Production Areas within the local vicinity. The row crop habitat being converted is not crucial to wildlife populations.

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[223] Arizona Game and Fish (2011) *Wildlife Compatible Fencing*, retrieved from: https://www.azgfd.com/wildlife/planning/wildlifeguidelines/, page 4.

[224] Colorado Division of Wildlife (December 2009) *Fencing with Wildlife in Mind*, retrieved from: https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf, page 3.

[225] Marcel Juijser, Angela Kociolek, Tiffany Allen, Partick McGowen, Patricia Cramer, and Marie Venner (April 2015) *Construction Guidelines for Wildlife Fencing and Associated Escape and Lateral Access Control Measures*, retrieved from: http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25%2884%29_FR.pdf, page 27.

[226] Arizona Game and Fish (2011), page 6.

[227] Department of Natural Resources (January 3, 2020).

[228] Department of Natural Resources (2013) *Wildlife-friendly Erosion Control*, retrieved from: http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf.

[229] USFWS Forensics Lab (2014) *Avian Mortality at Solar Energy Facilities in Southern California*, retrieved from: http://www.ourenergypolicy.org/wp-content/uploads/2014/04/avian-mortality.pdf.

The land control area is likely used as a travel corridor or, occasionally, as a food source (for example, standing corn).[230] Once restored, the land control area will provide native grassland habitat for the life of the project. This change might be attractive to some species, and not others. Fencing will restrict ingress and egress of larger wildlife, and habitat benefits will be limited to small mammals, birds, insects, etc. accustomed to human disturbance. The habitat will be mowed up to three times yearly, which might limit nesting opportunities, etc. The collection line corridor will remove approximately one and six-tenths miles of shelter belts. These areas provide habitat for small birds and mammals. Shelter belts also provide a travel corridor for wildlife passing through the area. Overall, the project does not contribute to significant habitat loss or degradation or create new habitat edge effects.

Mitigation

Siting facilities away from wildlife movement corridors can avoid or minimize impacts to wildlife movement.

Avoiding use of plastic erosion-control materials where possible and using biodegradable materials (typically made from natural fibers) instead can minimize the impact to wildlife. The site permit could include the use of natural fiber materials as a standard condition or as a special condition for facilities.

Fencing Minnesota DNR is updating its Commercial Solar Siting Guidance, which includes fencing recommendations.[231] To protect the site while minimizing impacts to wildlife, the site permit could require a specific type and height for security fencing. MDNR recommends fencing between 8-10 feet in height without barbed wire.

The site permit could require that visibility markers be placed at appropriate locations on perimeter fencing. Should wildlife, such as deer, enter the fenced area they would need an escape. The site permit could require that wildlife ramps be constructed "at corners where an accidentally trapped animal is more likely to find an escape" (Table 9) (Note the jump platform is lower than the fence, ensuring that it does not appear as a landing pad from the exterior).[232]

Trenching Checking open trenches and removing any wildlife caught in trenches before backfilling mitigates impacts.

Habitat Once permanent vegetation is established, restricting mowing from April 15 to August 15 will improve the potential for ground nesting habitat. Shelter belts could be replanted with low growing shrub vegetation.

Agency staff recommend use of best management practices established by BWSR and DNR. Staff further recommends the vegetation management plan be prepared in coordination with BWSR, DNR, Ag, MPCA, and EERA. The vegetation management plan and documentation of the coordination efforts between the permittee and the coordinating agencies shall be filed at least 14 days prior to the preconstruction meeting. Louise Solar anticipates meeting Minnesota's Habitat Friendly Solar Program requirements for the project, including developing a vegetation management plan, developing site specific seed mixes, and completing a project planning assessment form. All the documentation used to meet this standard will be provided to the PUC and BWSR.

[230] *Ibid*.
[231] Minnesota DNR Scoping Comments, June 8, 2021.
[232] *Id*., page 29.

Impacts to avian species caused by electrocution can be mitigated by use of best management practices for conductor spacing and shielding. These practices are codified in Avian Power Line Interaction Committee standards. Avian protection is a common commission route permit condition. Should an above-ground electrical collection system be used, the site permit could include similar language to mitigate avian impacts.[233]

Table 9 Wildlife Jump

Section 8.12 of the sample permit requires permittees to report "any wildlife injuries and fatalities" to the commission on a quarterly basis. Section 4.3.8 requires use of "site restoration and management practices that provide for native perennial vegetation and foraging habitat beneficial to gamebirds, songbirds, and pollinators". No additional mitigation is proposed.

Climate Change

Emissions from construction of the project will occur and will have a short- term negligible impact on climate change. The project will have a positive impact by offsetting carbon and helping Minnesota meet its renewable energy goals.

Minnesota is taking action against climate change. Executive Order (19-37), signed in December 2019, created the Governor's Advisory Council to coordinate climate change mitigation and resilience strategies in the State of Minnesota. The Executive Order describes climate change as an existential threat that impacts all Minnesotans and our ability to thrive.

Potential Impacts

The Next Generation Energy Act of 2017 set statutory goals to reduce greenhouse gas emissions in the state by 30% of 2005 levels by 2025, and 80% by 2050. Minnesota fell short of its 2015 goal of 15% and is not on track to meet the 2025 goal.[234] The Louise Solar Project will further the states' clean energy goals by providing a renewable source of energy that will offset other greenhouse gas

[233] *E.g.*, Public Utilities Commission (December 19, 2018) *Order Approving Route Permit*, eDockets No. 201812-148593-01, page 10.

[234] Site Permit Application, P. 80.

emissions, primarily from coal and natural gas. The project is expected to offset approximately 79,618 metric tons of C02, the equivalent of 9,187 homes' energy consumption for one year.[235]

Mitigation

Mitigation to reduce emissions during construction is discussed in this EA. The project has been designed with resiliency in mind as the climate continues to change in Minnesota. Project equipment has been carefully engineered and selected to withstand the potential for an increase in the frequency of severe weather events.[236] Similarly, the stormwater management system has been designed using NOAA Atlas-14, a modeling tool that provides precipitation frequency estimates for many of the Midwestern states, including Minnesota. The model takes into consideration the historical frequency of heavy rainfall events, which is of importance to project engineers when designing stormwater infrastructure that will be in place for the life of the project.[237] No additional mitigation is proposed.

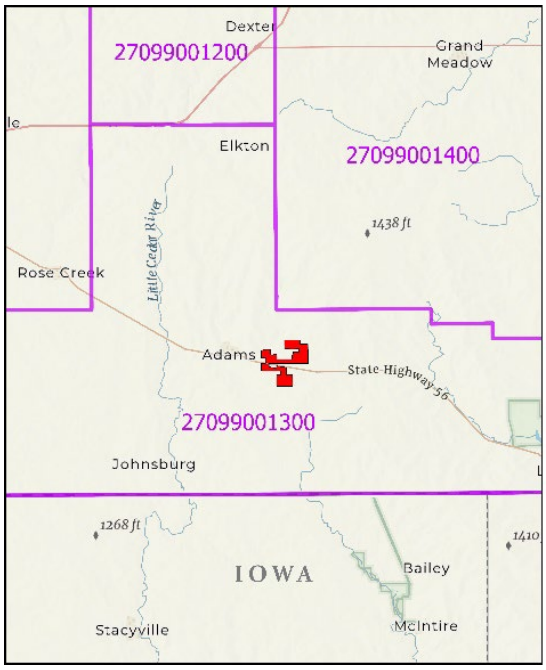
Environmental Justice

The project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations.

Environmental justice is the" fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[238] The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.[239]

[235] Id.
[236] Id.
[237] Id.
[238] US EPA Environmental Justice, https://www.epa.gov/environmentaljustice . Accessed August 2021.
[239] US EPA, Guidance for Incorporating Environmental Justice Concern in EPA's NEPA Compliance Analyses (pdf), Accessed August 2021.

Figure 7 Census Tracts in the Project Area



Potential Impacts

Utility infrastructure can adversely impact low-income, minority or tribal populations. To identify potential environmental justice concerns in the project area, the US EPA's EJ Screening Tool was used to consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations.[240] Low-income and minority populations are determined to be present in an area when the low-income percentage or minority group percentage exceeds 50 percent or is "meaningfully greater" than in the general population. In this analysis, a difference of 10 percentage points or more was used as the threshold to distinguish whether a "meaningfully greater" low-income or minority population resides in the ROI.

Staff conducted a demographic assessment of the affected community to identify low-income and minority populations using U.S. Census data. Table 10 provides low-income and minority population data and Figure 7 shows the census tracts used for analysis within Mower County.

Table 10 Low-Income and Minority Population Characteristics

Area	Census Tract	% Below Poverty	Median Household Income ($)	% Minority**
Minnesota	—	9.8	68,411	16.7
Mower County	—	11.9	53,665	11.6
Mower County (Comparison of Census Tract to Mower County)	1200	9.4	73,375	1.3
	1300	12.2	58,667	4.6
	1400	8.0	73,850	2.6

Source: U.S. Census Bureau, 2014-2018 American Community Survey
* The ROI is calculated by dividing the total minority population in the ROI by the total population of the ROI.
** Minority population includes all persons excluding those who self-identified as non-Hispanic white alone.

Mitigation

The project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations. No further mitigation is proposed.

[240] US EPA EJ Screen, https://www.epa.gov/ejscreen. Accessed August 2021.

Unavoidable Impacts

Resource impacts are unavoidable when an impact cannot be avoided even with mitigation strategies.

Potential impacts and the possible ways to mitigate against them were discussed in this chapter. However, even with mitigation strategies, certain impacts cannot be avoided. Most adverse unavoidable impacts are associated with construction; therefore, they would be temporary.

Unavoidable adverse effects associated with construction of the project (in some instances a specific phase of construction) would last as long as the construction period, and include:

- Fugitive dust.
- Noise disturbance to nearby residents and recreationalists.
- Visual disturbance to nearby residents and recreationalists.
- Soil compaction and erosion.
- Vegetative clearing (loss of shelter belts).
- Disturbance and temporary displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed.
- Minor amounts of marginal habitat loss.
- Possible traffic delays.

Unavoidable adverse impacts associated with the operation would last as long as the life of the project, and include:

  - Visual impacts of the project.
- Cultural impacts due to a change in the sense of place for local residents.
- Loss of land for agricultural purposes.
- Injury or death of birds that collide with or are electrocuted by conductors.
- Injury or death of birds that collide with PV panels
- Injury or death of birds and mammals from fencing.
- Potential decrease to property values.
- Minor amounts of continued maintenance of tall-growing vegetation along the collection line corridor.

Irretrievable or Irreversible Impacts

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use; an irretrievable commitment of resources means the resource is not recoverable for later use by future generations.

Irreversible and irretrievable resource commitments are primarily related to project construction, including the use of water, aggregate, hydrocarbons, steel, concrete, wood, and other consumable resources. Some, like fossil fuel use, are irretrievable. Others, like water use, are irreversible. Still others might be recyclable in part, for example, the raw materials used to construct PV panels would be an irretrievable commitment of resources, excluding those materials that may be recycled at the end of the panels' useful life. The commitment of labor and fiscal resources to develop, construct, and operate the project is considered irretrievable.

Cumulative Potential Effects

Cumulative potential effects result from the incremental effects of a project in addition to other projects in the environmentally relevant area.

Minnesota Rule 4410.0200, subpart 11a, defines "cumulative potential effects," in part, as the "effect on the environment that results from the incremental effects of a project in addition to other projects in the environmentally relevant area that might reasonably be expected to affect the same environmental resources, including future projects ... regardless of what person undertakes the other projects or what jurisdictions have authority over the project."

The "environmentally relevant area" includes locations where the potential effects of the project coincide with the potential effects of other projects to impact the elements studied in this EA.

Analysis Background

The ROI for cumulative potential effects varies across elements and is consistent with the ROI identified in Potential Impacts and Mitigation throughout this document. Cumulative potential effects—where they coincide—increase or decrease the breadth of the impact to the resources and elements studied in Potential Impacts and Mitigation. This may or may not change the impact intensity level assigned to the resource or element.

The following graphics are used to illustrate the potential for cumulative potential effects:

- ▲ Cumulative potential effects are anticipated.
- ▼ Cumulative potential effects are NOT anticipated.
- ◆ Cumulative potential effects are uncertain.

This table shows cumulative potential effects on human settlement.

Table 11 Potential for Cumulative Effects: Human Settlement

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
Aesthetics	Local Vicinity	▲	▲	▲
Cultural Values	Project Area	▼	▼	▼
Displacement	Project Area	▼	▼	▼
Electrical Interference	Project Area	▼	▼	▼
Land Use	Project Area	▲	▲	▲

Noise	Local Vicinity	▲	▼	▼
Property Values	Local Vicinity	▲	◆	▼
Recreation	Local Vicinity	▼	▼	▼
Socioeconomics	Mower County	▲	▲	▲

Public Health and Safety

This table shows cumulative potential effects to public health and safety.

Table 12 Potential for Cumulative Effects: Public Health and Safety

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
EMF	Land Control Area	▼	▼	▼
Electrical Interference	Land Control Area	▼	▼	▼
Stray Voltage	Land Control Area	▼	▼	▼
Medical Devices	Land Control Area	▼	▼	▼
Public Safety	Land Control Area	▼	▼	▼
Worker Safety	Land Control Area	▲	▲	▲

Public Services

This section describes cumulative potential effects to public services.

Table 13 Potential for Cumulative Effects: Public Services

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
Airports	Project Area	▼	▼	▼
Emergency Services	Project Area	▼	▼	▼
Roads	Project Area	▲	▼	▼
Utilities	Project Area	▲	▼	▼

Land-based Economies

This section describes cumulative potential effects to land-based economies.

Table 14 Potential for Cumulative Effects: Land-based Economies

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
Agriculture	Land Control Area	▲	▲	◆

Forestry	Land Control Area	▼	▼	▼
Mining	Land Control Area	▼	▼	▼
Tourism	Project Area	▼	▼	▼

Archaeological and Historical Resources

This section describes cumulative potential effects to archaeological and historic resources.

Table 15 Potential for Cumulative Effects: Archaeological and Historic Resources

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
Archaeological	Project Area	◆	◆	◆
Historic	Project Area	▼	▼	▼

Natural Resources

This section describes cumulative potential effects to natural resources.

Table 16 Potential for Cumulative Effects: Natural Resources

Element/Resource	Region of Influence*	Potential for Cumulative Effects		
		Short-term	Long-term	Permanent
Air Quality	Mower County	▲	▼	▼
Geology/Topography	Collection Line Corridor	▼	▼	▼
Groundwater	Collection Line Corridor	▼	▼	▼
Rare Resources	Project Area	▼	▼	▼
Soils	Land Control Area	▲	▼	◆
Surface Water	Land Control Area	▼	▼	▼
Vegetation	Land Control Area	▼	▼	▼
Wetlands	Land Control Area	▼	▼	▼
Wildlife and Habitat	Land Control Area	▲	▼	▼
Wildlife (birds)	Local Vicinity	▲	▼	▼

Air Quality The ROI is Mower County. Impacts associated with construction vehicles will occur over the short term (emissions and fugitive dust). Electrical lines within the switching station will produce ozone and nitrous oxide through the corona effect. Impacts would be long term to permanent, and be negligible. The overall impact intensity level is expected to remain minimal.

Soils The ROI is the land control area. Soils around the project substation may experience compaction and rutting from movement of construction vehicles. The overall impact intensity level is expected to remain minimal.

Wildlife The ROI for wildlife is the land control area. The ROI for birds is the local vicinity. Wildlife might be inadvertently harmed or killed during construction. Long term and permanent impacts include a greater risk of bird electrocution or collision due to increased electrical equipment on the landscape. Potential impacts can be mitigated. The overall impact intensity level is expected to remain minimal.

Chapter 6: Application of Siting Factors

The analysis that follows applies the information in the site permit application and this EA to the factors the commission must consider when making a site permit decision. Generally, EERA staff reviews these factors to help establish the relative merits of a proposed project against alternative power plant sites or transmission line routes studied in the environmental document. In this matter only one site was studied; therefore, the concept of relative merits is not applicable. However, because multiple electrical collection systems are proposed within the land control area the concept of relative merits applies to these systems.

The Minnesota Legislature directed the commission to select sites for large electric power generating plants that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.[241] The site must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.[242]

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that guide commission decisions when designating a site for a large electric power generating plant.[243] These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the commission must consider when making a permit decision. These factors are listed on page 9.

Some factors are described in just a few words, for example, effects on archaeological and historic resources. Other factors are more descriptive and include a list of elements that, when grouped, make up the factor. Finally, certain factors are relatively succinct, but the scoping process identified elements to be analyzed in this EA. For example, the public health and safety factor includes an EMF element.

Factor M (unavoidable impacts) and Factor N (irreversible and irretrievable resource commitments) were discussed in the previous chapter. Factor H (use of existing rights-of-way) and Factor J (use of existing infrastructure rights-of-way) apply solely to high voltage transmission lines. Factor G (application of design options) and Factor L (costs dependent on design) do not apply as the design of the proposed project is the only design under consideration. Should the applicant receive a generation interconnection agreement from the Midcontinent Independent System Operator, Factor K (electrical reliability) will be met. Other factors are ranked as follows:

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[241] Minn. Stat. 216E.02, subd. 1.

[242] *Ibid*.

[243] Minn. Stat. 216E.03, subd. 7(e) requires the commission "to make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons". A route permit will not be issued for this project; therefore, this factor is not relevant. However, the proposed gen-tie transmission line is proposed to be located parallel to existing high-voltage transmission line route, although not adjacent to it. The collection line corridor would follow existing road rights-of-way for most of its length.

 Impacts are anticipated to be negligible to minimal.

 Impacts are anticipated to be minimal to moderate.

 Impacts are anticipated to be moderate to significant.

Analysis

This analysis applies the siting factors to the project and discusses the relative merits of the different electrical collection systems.

Table 17 Application of Siting Factors/Relative Merits of Collection System

	Application of Siting Factors	
Factor A: Human Settlement		
Element	Construction	Operation
Aesthetics	○	○
Displacement	●	●
Cultural Values	●	●
Electric Interference	●	●
Floodplains	●	●
Land Use and Zoning	●	●
Noise	⊘	●
Property Values*	○	●
Recreation	⊘	●
Socioeconomics	●	●
Factor A: Public Services		
Element	Construction	Operation
Airports	●	●
Roads and Highways	○	●
Utilities	●	●
Factor B: Public Safety		
Element	Construction	Operation
EMF	●	●

	Application of Siting Factors	
Emergency Services	●	●
Medical Devices	●	●
Public Safety	●	●
Stray Voltage	●	●
Worker Safety	●	●

* On whole, impacts in the local vicinity are anticipated to be minimal and dissipate at

Factor C: Land-based Economies

Element	Construction	Operation
Agriculture	○	○
Forestry	●	●
Mining	●	●
Tourism	○	●

Factor D: Archaeological and Historic Resources

Element	Construction	Operation
Archeological	●	●
Historic	●	●

Factor E: Natural Resources

Element	Construction	Operation
Air Quality	●	●
Geology	●	●
Groundwater	●	●
Soils	○	●
Surface Water	●	●
Topography	●	●
Vegetation	●	●
Wetlands	●	●
Wildlife	●	○
Wildlife Habitat	●	●

	Application of Siting Factors	
Factor F: Rare and Unique Resources		
Element	Construction	Operation
Fauna	●	●
Flora	●	●

Discussion

The following discussion highlights potential impacts to factor elements that are anticipated to be moderate to significant.

Siting Factors

The following discussion highlights potential impacts to factor elements that are anticipated to be moderate to significant, and factors determined less consistent, consistent in part, or not consistent.

Factor A Human Settlement

Potential impacts to aesthetics are expected to be minimal to moderate for those with low viewer sensitivity, for example, passing motorists along State Highway 56. For those with high viewer sensitivity, for example, neighboring landowners or recreationists, the impact intensity level is anticipated to be moderate to significant. Impacts will be short- and long-term, and localized. They will be subjective to the individual.

Specific noise impacts are associated with construction and operation. The impact intensity level during construction is anticipated to range from negligible to significant depending on the activity. Potential impacts are anticipated to be intermittent and short-term. These localized impacts will affect unique resources (residences). Operational impacts are anticipated to be negligible.

Impacts to property values within the local vicinity could occur; however, changes to a specific property's value are difficult to determine. On whole, impacts in the local vicinity are anticipated to be minimal and dissipate at distance. Impacts to specific properties could be moderate to significant. Long-term impacts might or might not occur.

During construction potential impacts to recreation anticipated to be moderate to significant. Potential impacts will be intermittent and occur over the short-term. These localized impacts will affect a unique resource (campground). Impacts can be minimized or avoided. Operational impacts will be limited to aesthetics.

Potential impacts to roads and highways associated with construction are anticipated to be short-term, intermittent, and localized. The impact intensity level is expected to be minimal to moderate. During operation, no impacts to roads are anticipated; negligible traffic increases would occur for maintenance.

Factor C Land Based Economies

The impact intensity level to agriculture is anticipated to be minimal. Potential impacts are localized and unavoidable, but can be minimized. Minimizing impacts requires special mitigation. The site permit could require the applicant to work with the landowner to ensure agreement concerning continued access along the existing farm road.

Potential impacts to tourism are anticipated to be minimal to moderate during construction. Impacts will be localized and affect a unique resource. Impacts will be unavoidable, but minimal during operation.

Factor E Natural Resources

Potential impacts to wildlife will be positive or negative and species dependent. Long-term, minimal positive impacts to birds, small mammals, insects, snakes, etc. would occur. Impacts to large wildlife species, for example, deer, will be negligible. Significant negative impacts could occur during construction of the project. Once restored, the land control area will provide native grassland habitat for the life of the project. The project does not contribute to significant habitat loss or degradation, or create new habitat edge effects.

Factor I Power Plants

The project is not constructed at an existing power plant site; therefore, it is not consistent.