Environmental Report

345 kV Brookings County-Lyon County and Helena -Hampton Second Circuit Project

Human and Environmental Impacts of Constructing and Operating the

345 kV Brookings County – Lyon County and Helena – Hampton Second Circuit Project

March 2024

PUC Docket Nos. E-002/CN-23-200

OAH Docket No. 22-2500-39742

COMMERCE DEPARTMENT

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Project Contacts

Responsible Government Unit
Public Utilities Commission
121 Seventh Place East, Suite 350
Saint Paul, MN 55101-2147

Commission Representative
Michael Kaluzniak
(651) 201-2257
mike.kaluzniak@state.mn.us

Preparer
Department of Commerce
85 Seventh Place East, Suite 280
Saint Paul, MN 55101-2198

Commerce Representative
Suzanne Steinhauer
(651) 539-1843
suzanne.steinhauer@state.mn.us

Project Proposer
Xcel Energy, on behalf of the Applicants
414 Nicollet Mall
Minneapolis, MN 55401

Proposer's Representative
Timothy Rogers
(612) 330-1955
Timothy.G.Rogers@xcelenergy.com

Xcel Energy, Central Minnesota Municipal Power Agency; Great River Energy; Otter Tail Power Company; and Western Minnesota Municipal Power Agency (collectively, Applicants) propose to install a second 345 kV circuit on double-circuit-capable structures on approximately 88 miles (Project) of the 229-mile 345 kV Electric Transmission Line between the Brookings County Substation in Brookings County, South Dakota and the Hampton Substation in Dakota County, Minnesota (Original Brookings Line, Docket 08-1474). The Original Brookings Line was constructed in phases and was fully energized in 2015. The Applicants must obtain a certificate of need and a minor alteration to the existing route permit from the Minnesota Public Utilities Commission before they can construct the proposed Project.

This environmental report evaluates the potential human and environmental impacts of the Project and three alternatives to the Project – a no build alternative, a generation alternative which includes new generation or upgrades to existing generation, transmission of a different voltage, and transmission with different endpoints. This ER will be used by the Minnesota Public Utilities Commission in deciding whether to issue a certificate of need for the Project.

Sources

Information for this report has been gathered from multiple sources that are cited throughout the report. The primary source documents are the certificate of need and minor alteration applications submitted by the Applicants. Additional sources include information from relevant federal and state environmental review documents for similar projects.

Project Mailing List

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ACRONYM/TERM	DEFINITION
ALJ	administrative law judge
Applicants	Xcel Energy, Central Minnesota Municipal Power Agency; Great River Energy; Otter Tail Power Company; and Western Minnesota Municipal Power Agency
BMP	best management practice
Brookings 2nd Circuit Project	345 kV Brookings County – Lyon County and Helena – Hampton Second Circuit Project
Commerce	Minnesota Department of Commerce
Commission	Minnesota Public Utilities Commission
CN	certificate of need
CR	County Road
dBA	A-weighted decibels
distribution	relatively low-voltage lines that deliver electricity to a retail customer's home or business
DNR	Minnesota Department of Natural Resources
ELF	extremely low frequency
EMF	electromagnetic field
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GPS	global positioning system
GRE	Great River Energy
HAP	hazardous air pollutant
HVTL	High voltage transmission line; in Minnesota, this is a transmission line of 100 kV or greater
kV	kilovolt
MBS	Minnesota Biological Survey
MDH	Minnesota Department of Health
MISO	Midcontinent Independent Transmission System Operator, Inc.
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MW	megawatt

ACRONYM/TERM	DEFINITION
MWh	megawatt-hour
NAC	noise area classification
NESC	National Electric Safety Code
NEV	neutral-to-earth voltage
NHIS	Natural Heritage Information System
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
Original Brookings Line	345 kV Electric Transmission Line between the Brookings County Substation in Brookings County, South Dakota and the Hampton Substation in Dakota County, Minnesota
Original Brookings Permit	Route permit issued September 14, 2010, to Great River Energy and Northern States Power Company d/b/a Xcel Energy for the construction of a high-voltage transmission line and associated facilities in Lincoln, Lyon, Yellow Medicine, Chippewa, Redwood, Brown, Renville, Sibley, LeSuer, Scott and Dakota Counties
Permittees	Great River Energy and Northern States Power Company d/b/a Xcel Energy
PM	particulate matter
ppm	parts per million
Project	345 kV Brookings County – Lyon County and Helena – Hampton Second Circuit Project
PWI	Public Waters Inventory
ROW	Right-of-way
SHPO	Minnesota State Historic Preservation Office
SWPPP	stormwater pollution prevention plan
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WCA	Wetland Conservation Act
WIA	Walk-In Access

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1 Introduction

This environmental report (ER) has been prepared for the 345 kV Brookings County – Lyon County and Helena – Hampton Second Circuit Project (Brookings 2nd Circuit Project or Project) proposed by Xcel Energy, Central Minnesota Municipal Power Agency; Great River Energy (GRE); Otter Tail Power Company; and Western Minnesota Municipal Power Agency LLC (collectively, the Applicants).

The Applicants propose to install a separate second 345 kilovolt (kV) circuit on double-circuit-capable structures on the Minnesota portion of the Brookings County to Lyon County (Western Segment) and Helena to Hampton (Eastern Segment) portions of the 345 kV Electric Transmission Line between the Brookings County Substation in Brookings County, South Dakota and the Hampton Substation in Dakota County, Minnesota (Original Brookings Line).

The Applicants must obtain a certificate of need (CN) and a minor alteration to the existing route permit for the Original Brookings Line from the Minnesota Public Utilities Commission (Commission) before it can construct the Project.

The Minnesota Department of Commerce (Commerce) prepared this ER for the Project. The ER describes the potential human and environmental impacts of the Project and alternatives to the Project.

1.1 What do the applicants propose to construct?

The Applicants propose to install separate a second 345 kV circuit on double-circuit-capable structures on the Minnesota portion of the Brookings County to Lyon County (Western Segment) and Helena to Hampton Minnesota (Eastern Segment) segments of the Brookings – Hampton 345 kV Transmission Line.

In 2010, the Commission issued a high voltage transmission line (HVTL) route permit (Original Brookings Permit) for the Original Brookings Line in Commission Docket 08-1474.[1] The route permit authorized construction of approximately 229 miles of new 345 kV transmission line between the Minnesota-South Dakota border and the Hampton Substation in Dakota County, Minnesota.[2] The Original Brookings Line was constructed in phases and was fully energized in 2015. The 141-mile segment between the Lyon County Substation and Helena Substation was constructed with the second circuit installed. The Commission approved construction of double-circuit capable structures for the Minnesota portion of the Brookings County – Lyon County (Western Segment) and Helena – Hampton segment (Eastern Segment) but required the utilities to obtain a CN to add a second circuit to the Western and Eastern segments.

[1] Commission, *Order Granting Route Permit in the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, September 14, 2010, eDocket ID: 20109-54429-01; Permit Addendum, March 1, 2011, eDocket ID: 20113-60003-01 The text pf the permit is included in Appendix C of this document.

[2] The length of the Original Brookings Line between the Brookings County Substation in South Dakota and the Hampton Substation in Dakota County, Minnesota is 240 miles, the western most 10.9 miles of the line are in South Dakota.

The Applicants propose to install separate a second 345 kV circuit on double-circuit-capable structures on the Minnesota portion of the Western Segment and the Eastern Segment of the Original Brookings Line (Figure 1). While the Project largely consists of adding the additional circuit the Applicants will also add 11 new structures to facilitate the addition of the new circuit.

Figure 1. Brookings 2nd Circuit Project

The Applicants indicate the Project will improve the deliverability of wind generation, reduce curtailments of wind energy, and improve the regional transmission system. The Applicants contend that the Project will improve the transmission system's ability to respond to unplanned system outages and enable access to a diverse mix of generation resources.

The Applicants plan to place the Western Segment in service by September 2024, and the Eastern Segment in service by September 2025.

1.2 What is the State of Minnesota's Role?

The Applicants need a CN and a minor alteration of the existing route permit from the Commission to construct the Project. Commerce prepared this ER. An administrative law judge will oversee a public hearing.

The proposed project requires two approvals from the Commission – a CN and a minor alteration to the existing route permit for the Original Brookings Line issued by the Commission in September 2010.

In addition to these approvals from the Commission, the Project also requires approvals (e.g., permits, licenses) from other state agencies and federal agencies with permitting authority for specific resources (e.g., the waters of Minnesota). Commission route permits supersede and preempt all zoning, building, and land-use regulations promulgated by local units of government.

In its consideration of the CN application, the Commission must consider whether the proposed project is needed, or whether some other project would 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.

To help the Commission with its decision-making and to ensure a fair and robust airing of the issues, the state of Minnesota has set out a process for the Commission to follow in making its decisions. This process includes: (1) development of an environmental report (ER), and (2) a public hearing before an administrative law judge (ALJ).

The goal of the ER is to describe the potential human and environmental impacts of the Project and alternatives to the Project. The goal of the hearing is to advocate, question, and debate what decisions the Commission should make about the Project. The entire record developed in this process—the ER, and the report from the ALJ, including all public input and testimony—is considered by the Commission when it makes its decisions on an applicants' CN application.

If the Commission determines that the Project is needed, it will also consider whether to approve the Applicants' request for a minor alteration to the existing route permit for the Original Brookings Line what, if any, conditions are necessary in the requested minor permit alteration to ensure environmental preservation, sustainable development, and the efficient use of resources. The request for a minor alteration does not require preparation of an environmental review document.

1.3 What is the public's role?

Minnesota needs your help to make informed decisions.

During scoping, you told us your concerns about the Project so that we could collect the right facts. At the public hearing, which comes next, you can tell us what those facts mean, and if you think we have represented them correctly in this ER. Your help in pulling together the facts and determining what they mean will help the Commission make informed decisions regarding the project.

1.4 What is an Environmental Report?

This document is an Environmental Report. The Commission will use the information in this document to inform their decisions about issuing a CN for the Project.

This ER discusses potential human and environmental impacts and mitigation measures from the Project and alternatives to the Project. Commerce staff 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 ER an, suggest alternatives to the project.

1.5 How is this document organized?

This ER addresses the matters identified in the scoping decision filed in the docket on January 24, 2024 (**Appendix A**).[3] This ER is organized into seven sections:

- Section 1: Introduction
- Section 2: Regulatory Framework
- Section 3: Proposed Project
- Section 4: Proposed Project – Human and Environmental Impacts
- Section 5: Project Alternatives – Human and Environmental Impacts
- Section 6: Availability and Feasibility of Alternatives
- Section 7: References

1.6 Where do I get more information?

For additional information don't hesitate to contact Commerce of Commission staff.

If you would like more information or if you have questions, please contact Commerce staff: Suzanne Steinhauer (suzanne.steinhauer@state.mn.us),(651) 539-1843) or Commission Staff: Michael Kaluzniak (mike.kaluzniak@state.mn.us, (651) 201-2257).

The CN application can be found on eDockets: https://www.edockets.state.mn.us/EFiling/search.jsp by searching "23" for year and "200". Information is also available on Commerce's webpage: https://apps.commerce.state.mn.us/web/project/338.

[3] Commerce, Environmental Report Scoping Decision, January 24, 2024, eDocket ID: 20241-202606-01

2 Regulatory Framework

The Project requires two approvals from the Commission – a CN and a minor alteration to the existing route permit. The Project will also require approvals from other state and federal agencies with permitting authority for actions related to the Project.

2.1 Certificate of Need

The proposed project, approximately 88 miles of 345 kV transmission line meets the statutory definition of *large energy facility*, which includes any high voltage transmission line with a capacity of 200 kV or more and greater than 1,500 feet in length.[4] Construction of a large energy facility in Minnesota requires a CN from the Commission.[5] The Applicants filed a CN application on August 15, 2023.[6]

The Commission must determine whether the proposed project is needed or if another project would be more appropriate for the state of Minnesota. Minnesota Rules, part 7849.0120 provides the criteria that the Commission must use in determining whether to grant a CN:

- The probable result of denial would be an adverse effect on the future adequacy, reliability, or efficiency of energy supply to the applicants, to the applicants' customers, or to the people of Minnesota and neighboring states.
- A more reasonable and prudent alternative to the proposed facility has not been demonstrated by a preponderance of the evidence on the record.
- 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.
- 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 that the applicants have met these criteria, a CN is granted. The Commission's CN decision determines the type of project, the size of the project, and its timing. The Commission could place conditions on the granting of a CN.

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[4] Minnesota Statutes 216B.2421, subd. 2(2).
[5] Minnesota Statute 216B.243, subd. 2
[6] Applicants, *Application to the Minnesota Public Utilities Commission for a Certificate of Need for the Proposed 345 kV Brookings County – Lyon County and Helena – Hampton Second Circuit Project.* August 15, 2023, eDocket No: 20238-198271-01, 20238-198271-02 , 20238-198271-03 , 20238-198271-05, and 20238-198271-06..(herein after, CN Application)

The CN decision does not determine the locations of transmission structures of or conditions on the construction of the Project; these determinations are made in the Commission's decision on whether to issue a minor alteration for the 2010 route permit for the Original Brookings Line.

2.2 Minor Alteration to Route Permit

In in addition to the CN, the Commission must also approve changes to the Original Brookings Permit (Appendix C) to allow the second circuit to be installed before the Project can be constructed. The route permit was issued in 2010 and subsequently amended several times through minor alterations prior to the Original Brookings Line's completion of construction in 2015.

The Applicants filed an application for a Minor Alteration to the existing route permit on November 13, 2023[7]. A minor alteration is a change to a large energy facility (either a generating facility or high voltage transmission line) that does not result in major changes to the human or environmental impacts.[8]

2.3 Environmental Review

The Minnesota Environmental Policy Act requires that governmental units consider the human and environmental impacts of a project prior to approving the construction and operation of the project.

An ER is intended to facilitate informed decision-making by the Commission and other entities with regulatory authority over a proposed project. An ER describes and analyzes the potential human and environmental impacts of a project and alternatives to the project. It does not advocate or state a preference for a specific alternative.

Scoping is the first step in the development of the ER for the project. The scoping process has two primary purposes: (1) to gather public input as to the impacts, mitigation measures, and alternatives to study in the ER, and (2) to focus the ER on those impacts, mitigation measures, and alternatives that will aid in the Commission's decisions on the CN.

Commerce staff gathered input on the scope of the ER through public meetings and an associated comment period. Commission and Commerce staff held three public information and scoping meetings in December 2023. Approximately seven persons attended the meeting held December 11, 2023, in Lakeville, Minnesota and four attendees provided public comments.[9] Comments addressed construction impacts on local roads, easements with individual landowners, noise during construction and operation,

[7] Applicants, *Application for a Minor Alteration of CaxX2020 Brookings Hampton Route Permit to Add the Brookings County – Lyon County and Helena – Hampton Second Circuit Project*, November 13, 2023, eDocket No: 202311-200430-01, 202311-200430-02, 202311-200430-03, 202311-200430-04, 202311-200430-05 202311-200430-06, 202311-200430-07, and 202311-200430-08 (herein after, MA Application)
[8] Minnesota Rule, part 7850.4800
[9] Oral Comments, Public Scoping and Information Meeting, Lakeville, Minnesota, December 11, 2023 eDocket No: 20241-202040-01

public health and safety related to electromagnetic fields, project cost and impact on rates, and tree clearing outside the transmission right-of-way.

In addition to the Lakeville meeting, a remote access was held the evening of December 11, 2023, and a meeting attended by seven people was held in Marshall, Minnesota on December 12, 2023. There were no public comments at either of those meetings.[10]

In addition to the oral comments received at the in public information and scoping meetings, written comments were received from the two members of the public, the Minnesota Department of Agriculture, the Minnesota Department of Transportation (MnDOT), the Minnesota Department of Natural Resources (DNR), and the Applicants by the close of the comment period on January 3, 2024.

Based on public comments and applicable rules, Commerce issued the scoping decision for the ER on January 24, 2024 (**Appendix A**). The scoping decision identifies the human and environmental impacts to be analyzed for the Project and alternatives to the Project. Based on the scoping decision, Commerce staff has prepared this ER. The ER will be entered into the record for these proceedings so that it can be used by the Commission in making decisions about the CN for the Project.

2.4 Public Hearing

After the issuance of the ER, a public hearing will be held. The hearing will be presided over by an ALJ from the Office of Administrative Hearings. At the hearing, citizens, agencies, and governmental bodies will have an opportunity to submit comments, present evidence, and ask questions. The ALJ will submit a report to the Commission summarizing public comments.

2.5 Commission Decision

After considering the entire record, the Commission will determine whether to grant a CN for the Project. The Commission may place conditions on the granting of a CN.

If a CN is granted, the Commission will also determine whether to grant the minor alteration to the existing route permit and, if it is granted, what, if any, conditions are appropriate. At the time this report was prepared, decisions by the Commission on the CN and minor alteration applications are anticipated in mid-2024.

2.6 Other Permits and Approvals

Commission-issued route permits supersede local planning and zoning and bind state agencies; thus, state agencies are required to participate in the Commission's permitting process to aid the Commission's decision-making and to indicate routes that are not permittable.

[10] Oral Comments, Public Scoping and Information Meeting, Virtual, , December 11 2023 eDocket No: 20241-202040-03; Oral Comments, Public Scoping and Information Meeting, Marshall, Minnesota, December 12, 2023, eDocket No: 20241-202040-05

However, various federal, tribal, state, and local approvals may be required for activities related to the construction and operation of the Project. All permits subsequent to the Commission's issuance of a route permit and necessary for the Project (commonly referred to as "downstream permits") must be obtained by a permittee. The information in this ER may be used by downstream permitting agencies in their evaluation of impacts to resources. Table 1 lists permits and approvals that could be required for the Project, depending on the final design.

Table 1. Potential Permits

Regulatory Authority	Permit or Approval Permit	Applicability to Project ion
Local Approvals		
County, Township, City	Road Crossing/Right-of-Way Permits	Needed to work within county road ROWs
	Utility Permits	Needed to construct or maintain electrical lines along or across county highway ROW
	Oversize / Overweight Permits	Needed to transport oversized and overweight loads on county roads
	Driveway/Access Permits	Needed to move, widen, or create a new driveway from county roads
Local Soil and Water Conservation Districts	Local/State/Federal Application for Water/Wetland Projects (under WCA)	Ensures conservation of wetlands
State Approvals		
Minnesota Public Utilities Commission	Certificate of Need	Required approval of the Project
	Minor Alteration to Route Permit	Required for alterations to Original Brookings Line
South Dakota Public Utilities Commission	Certification of Modification to Facilities Permit	Required approval of the Project
Minnesota Department of Natural Resources	Threatened & Endangered Species Consultation	Coordination to establish conservation measures for state species that are threatened, endangered, or of special concern.
	License to Cross Public Waters	Prevent impacts associated with crossing public lands and waters
	Construction Dewatering Permit	As required for construction dewatering
Minnesota Department of Transportation	Utility Permit	Needed to construct or maintain electrical lines along or across MnDOT ROW
	Driveway/Access Permits	Required when a change in access is necessary to a MnDOT right-of-way or property.
	Oversize/Overweight Permits	Required for transport of oversize/overweight project components to project site.

Regulatory Authority	Permit or Approval Permit	Applicability to Project ion
Board of Soil and Water Resources	Wetland Conservation Act Exemption Concurrence	Ensures conservation of wetlands
	Reinvest in Minnesota (RIM) easement	Coordination to minimize impacts from temporary workspace
Minnesota Pollution Control Agency	Section 401 Water Quality Certification National Pollutant Discharge Elimination System Permit	Ensures project will comply with state water quality standards Required to minimize impacts to waters due to construction of the project. Required for construction disturbances of more than one acre.
Minnesota State Historic Preservation Office (SHPO)	Cultural Resources Review	Consultation with SHPO regarding archaeological, historic, and cultural resources that could be present in the project area. Development of any necessary cultural resource plans for the project.
Federal Approvals		
United States Fish and Wildlife Service	Section 7 Consultation	Coordination to establish conservation measures for endangered species.
United States Army Corps of Engineers	Section 404 Permit	Protects water quality by controlling discharges of dredged and fill material
Federal Aviation Administration	Notice of Proposed Construction (7460-1) Notice of Actual Construction or Alteration	Review of tall structures and determination of no hazard;

3 Proposed Project

The Applicants propose to install a second 345 kV circuit to approximately 88 miles of the Original Brookings Line. The Original Brookings Line was constructed between the Brookings Substation in Brookings County, South Dakota and the Hampton Substation in Dakota County, Minnesota; approximately 229 miles of the Original Brookings Line is in Minnesota.

3.1 Project Description

The Applicants propose to add new conductors along the western and eastern segments of the Original Brookings Line. The 141--mile segment between the Lyon County and Helena substations was constructed and currently operates with two 345 kV circuits and is not part of the Project. With the exception of 11 new structures in three locations., the conductors will be installed on existing double-circuit structures. Except for one new structure located southeast of the Chub Lake Substation the Project will not change the existing 150-foot right-of-way (ROW) of the Original Brookings Line. In addition to the new circuit, the Applicants will also make changes to seven existing substations (the Brookings County Substation in South Dakota as well as the Steep Bank Lake, Hawks Nest Lake, Lyon County, Helena, Chub Lake, and Hampton substations in Minnesota.

3.1.1 Western Segment

The Western Segment comprises approximately 48.9 miles in Lincoln and Lyon counties between the Minnesota -South Dakota border and the Lyon County Substation (Figure 2, Table 2).

Within this segment, the Applicants propose to add one additional structure within the existing ROW outside the Steep Bank Lake Substation near Hendricks in Lincoln County. The Applicants will relocate the existing circuit to the new structure and tie the new circuit into the substation using existing structures. This change will allow the second circuit to avoid crossing an existing transmission line. This realignment is entirely within the existing ROW for the Original Brookings Line. The Applicants will change relay settings at the Steep Bank Lake and Hawks Nest Lake substations to accommodate the reconfiguration.[11]

The Applicants will also add one new 345 kV breaker to the Brookings County Substation in South Dakota, and four new 345 kV breakers to the Lyon County substation. The Applicants will replace the current ring-bus configuration at the Lyon County Substation with a new breaker-and-a-half configuration to improve operational flexibility and reliability by reducing line outages caused by breaker maintenance or failure.[12] These changes will not result in changes outside of the fenced area of any of these substations.

[11] CN Application, at p. 19
[12] CN Application, at p. 20

Figure 2. Brookings 2nd Circuit Project - Western Segment

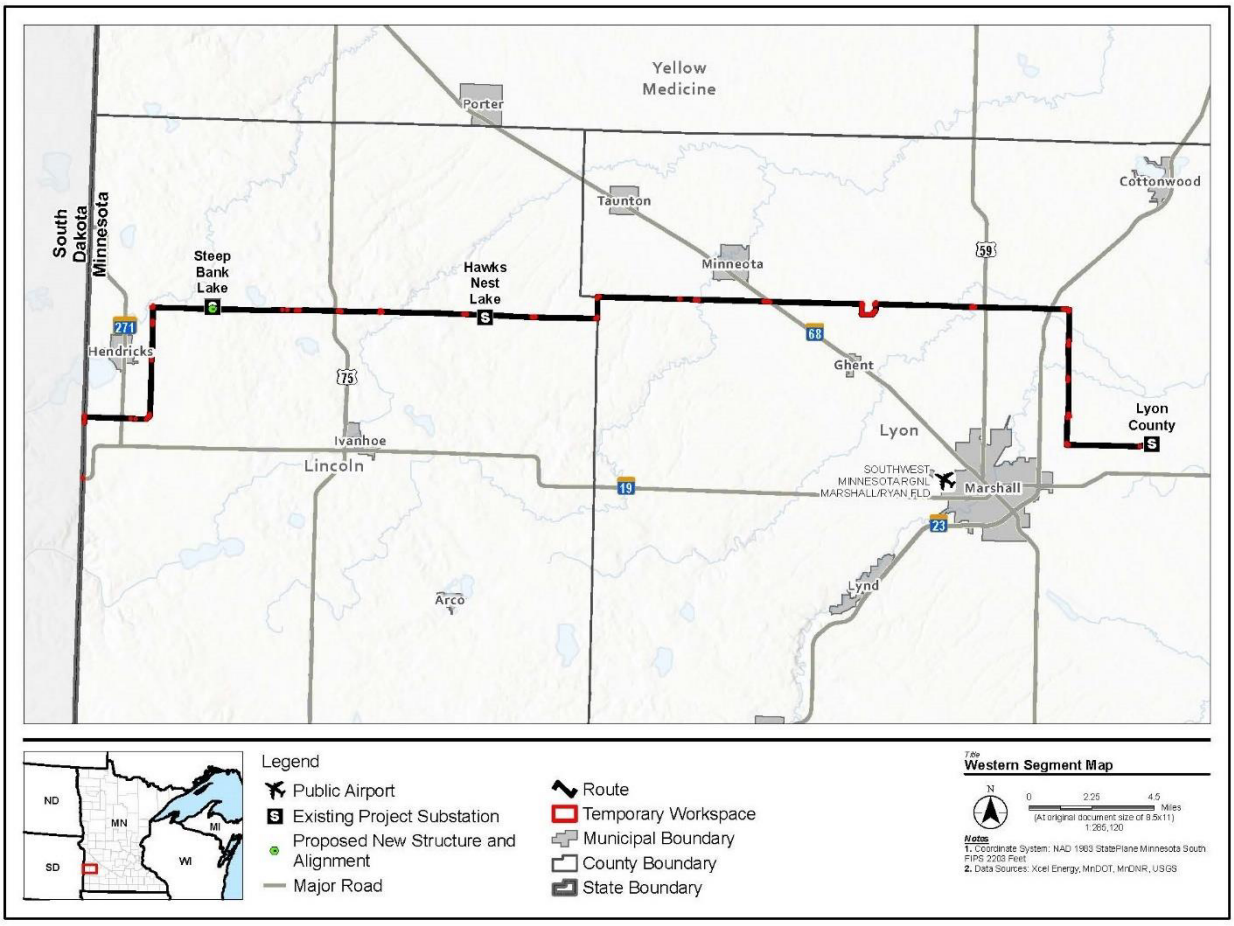


Table 2.Brookings 2nd Circuit Western Segment Location

County Name	Township/City Name	Township	Range	Sections
Lincoln	Hendricks Township	112N	46W	2-5, 8. 11, 17, 29, 32
		112N	47W	25, 36
	Limestone Township	112N	44W	1, 3, 5
	Royal Township	112N	45W	2, 4-6, 8-9, 11
	Shaokatan Township	111N	47W	12
Lyon	Eidsvold Township	113N	43W	31, 34
	Fairview Township	112N	41 W	2, 5, 11-12,14, 24-26, 35-36
	Grandview Township	112N	42W	2, 3, 6
	Nordland Township	112N	43W	1, 3
	Stanley Township	112N	40W	29, 32
	Vallers Township	113N	41W	33
	Westerheim Township	113N	42W	31, 35

3.1.2 Eastern Segment

The Eastern Segment comprises approximately 39 miles inn Scott and Dakota counties between the Helena Substation west of New Prague and the Hampton Substation north of Hampton (Figure 3,

Table 3).

Figure 3. Brookings 2nd Circuit Project - Eastern Segment

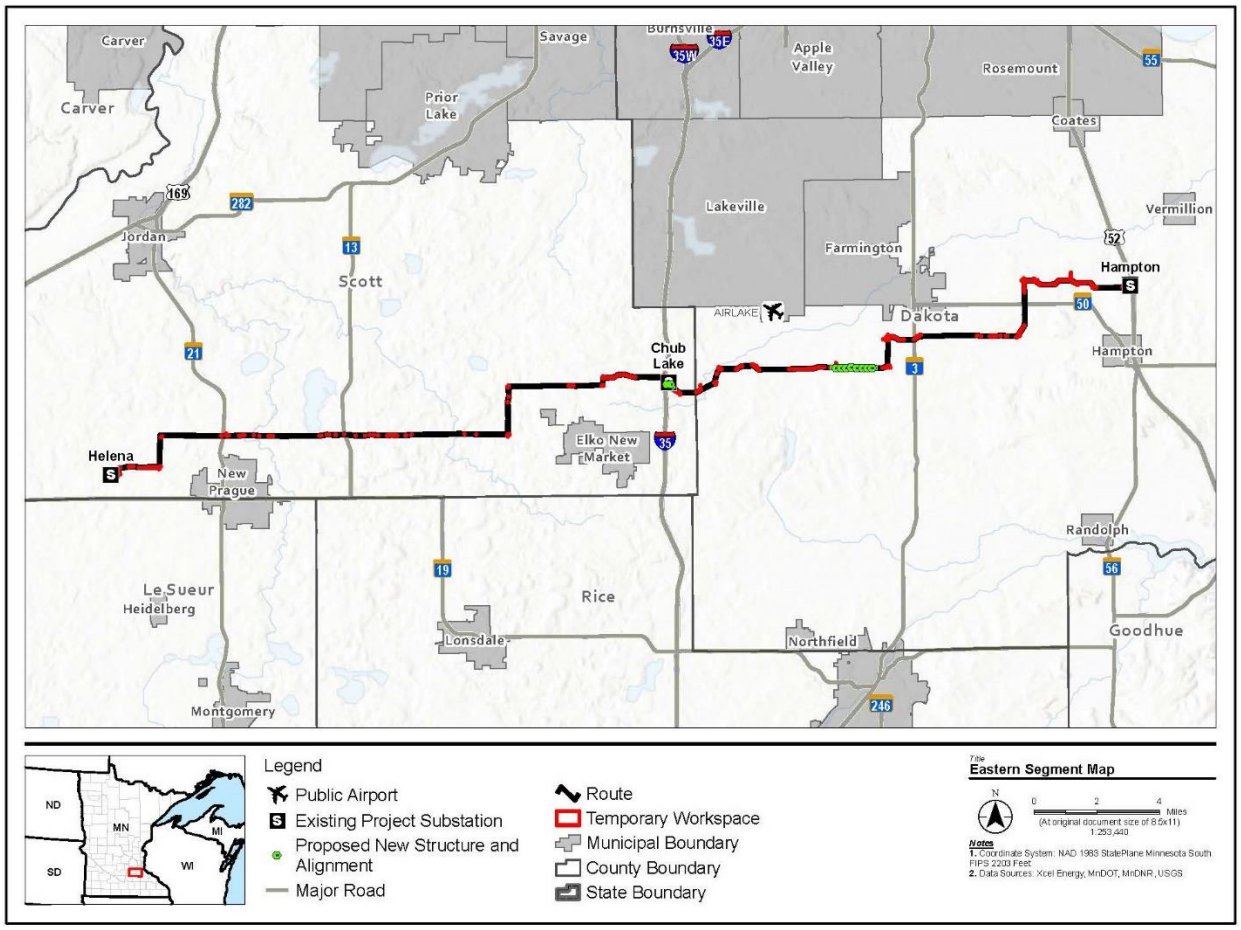


Table 3. Brookings 2nd Circuit Eastern Segment[13]

County Name	Township/City Name	Township	Range	Sections
Scott	Belle Plaine	114N	18W	25, 36
	Cedar Lake	113N	22W	13, 19-21, 23-26, 28-30
	Helena	113N	23W	1,21-22, 26, 27, 29-31
	New Market Township	113N	21W	13-19, 30
Dakota	Castle Rock Township	113N	19W	2-8, 11
	Empire City	114N	19W	35, 36
	Eureka Township	113N	20W	7-13, 15, 16, 18
	Vermillion Township	1114N	18W	31, 32

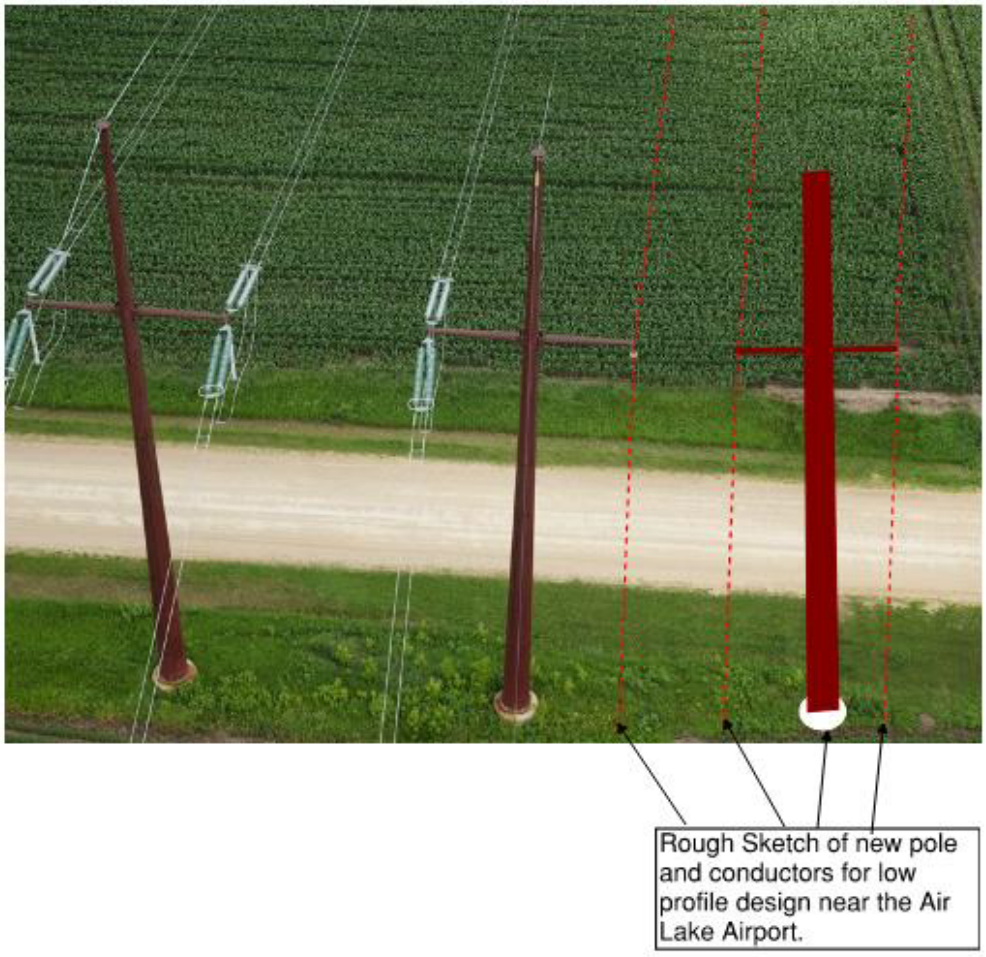
Within this segment the Applicants propose to construct two new dead-end structures on the south side of the Chub Lake Substation in New Market Township in Scott County. This change will allow the second circuit to avoid crossing an existing transmission line by bypassing the substation and will result in a separate set of structures for the second circuit for approximately 1,700 feet This realignment will require new ROW within existing Xcel Energy easements, GRE-owned land, and Scott County road ROW.[14]

Within this segment, the Original Brookings Line changes to a horizontal configuration for approximately 1.5 miles to meet Federal Aviation Administration (FAA) requirements near the Airlake Airport in Farmington. The Applicants propose to add eight new low-profile (90 – 110 foot) structures within the existing ROW along this segment to support the new circuit. Each of the new structures would be adjacent to two existing low-profile structures that support the Original Brookings Line. Two conductors from the new circuit would be placed on each new structure and the third conductor would be placed on an empty space on one of the existing structures (Figure 4)

The Applicants will also add one new 345 kV breaker to the Helena Substation, and four new 345 kV breakers to the Hampton substation. The Applicants will replace the current ring-bus configuration at the Hampton Substation with a new breaker-and-a-half configuration to improve operational flexibility and reliability by reducing line outages caused by breaker maintenance or failure.[15] These changes will not result in changes outside of the fenced area of any of these substations.

[13] Adapted from MA Application, Table 2-1
[14] MA Application, at pp. 5-6
[15] CN Application, at p. 20

Figure 4. Airlake Structure Illustration



3.2 Project Construction

Construction of the Project would not begin until all necessary federal, state, and local approvals have been obtained, easements have been acquired for any new ROW, and final plans and profiles have been approved by the Commission. Unless otherwise noted, this section is adapted from Section 6 of the CN application.

3.2.1 Right-of-Way Acquisition

Except for one structure near the Chub Lake Substation (Eastern Segment), the Project is located on the existing transmission ROW for the Original Brookings Line. The Applicants will obtain an easement from Scott County to locate the structure within Scott County Road ROW.

3.2.2 Construction

For most of the Project, which requires adding a second circuit to existing double-circuit capable structures, construction would generally progress as follows:

- Survey marking of the existing ROW and environmental constraints (e.g. existing utilities, wetlands).
- Establishment of laydown and staging areas.
- Grading or filling as necessary.
- Conductor stringing.
- Installation of any markers (e.g., bird flight diverters or air navigational markers) required by state or federal permits on conductors or shield wires.

In the areas where new poles will be installed, construction will also involve:

- Survey marking of any new ROW, pole locations, and environmental constraints (e.g. existing utilities, wetlands).
- ROW clearing and access preparation. Given the Project's setting is almost entirely within existing transmission ROW, tree clearing, and extensive route excavation is expected to be minimal.
- Excavation of holes for structures,
- Installation of culverts and concrete foundations for select structures.
- Installation of poles, insulators, and hardware.

The Applicants anticipate establishing two or more staging or laydown areas to receive and store equipment and materials required for construction of the Project.

A variety of construction vehicles, including cranes, bucket trucks, flatbed tractor-trailers, flatbed trucks, pickup trucks, helicopters, and trailers or other hauling equipment will be used in the installation of the second circuit.

Where new structures are located, construction equipment will also include mowers, backhoes, digger-derrick line trucks, drill rigs, dump trucks, front-end loaders, tree removal equipment, bulldozers, and concrete trucks. Excavation equipment is often set on wheeled or track-driven vehicles

For locations where new poles will be installed, once foundations are constructed, poles, insulators, hardware, clamps, and grounding equipment are moved from staging areas and delivered to the foundation locations. Steel arms and/or insulator assemblies, mast arms for shield wires, additional hardware and pulling blocks will all be attached to the structures while on the ground. After attachment of component parts, structures are lifted into place with a crane or similar heavy-lift equipment and secured. Holes will be backfilled with aggregate or concrete delivered from a local batch plant.

Once structures are in place, conductors are strung. Stringing setup areas are established to store spools of conductor cables approximately every two miles. These setup areas are typically established within existing ROWs or in temporary construction easements. Where conductors cross streets, roads, or highways, temporary guard or clearance poles will be used to ensure that conductors do not obstruct or otherwise interfere with traffic.

Conductor pulling lines are secured through stringing blocks suspended from insulators on the poles either by helicopter or ground crews. The conductors are pulled through each block by the pulling lines. Once conductors are strung and final conductor sag is established, the conductor is secured to the insulator hardware and shield wire is secured to clamps. For most of the Project, the second circuit will be secured by helicopter. A crane will be used in limited areas, such as dead-end structures, where helicopter work is infeasible. Conductor-marking devices, e.g., bird flight diverters, will be installed, as necessary, once conductors are in place. Shield wire is installed in a similar manner.

Some soil conditions and environmentally sensitive areas may require unique construction techniques. The most effective way to minimize impacts to these areas is to avoid placing structures in these areas, e.g., spanning the transmission line over wetlands, streams, and rivers. When spanning sensitive areas is not feasible, one or more of the following practices can be used to minimize impacts:

- Using the shortest route to access wetlands
- Assembling structures in upland areas before transporting to site for installation
- Constructing during frozen ground conditions. Given the timing of the proposed construction, this mitigation measure is not anticipated.
- Using construction mats when winter construction is not possible and wetlands and other sensitive areas could be impacted.
- Avoiding equipment fueling and maintenance activities in or near environmentally sensitive areas.
- Implementing the best management practices in the project's Stormwater Pollution Prevention Plan (SWPPP), which may include use of silt fences, bio logs, erosion-control blankets embedded with seeds, and other measures.

3.3 Operation and Maintenance

Transmission lines and substations are designed to operate for decades and require only moderate maintenance. Nationwide, the electric transmission system is very reliable, with an average annual availability of transmission infrastructure of more than 99 percent. Protective relaying equipment automatically take a transmission line out of service when a fault is sensed on the system. Both system faults and scheduled maintenance are infrequent.

The Applicants will designate a maintenance provider (either Xcel Energy or GRE) that will be responsible for the operation, maintenance, and, when necessary, repair of the transmission line. The maintenance provider will perform annual aerial inspections of the Brookings – Hampton line (both the Original Brookings Line and the Project) and will inspect the line from the ground every four years. The maintenance provider, or its agents, will periodically access to the ROW to perform inspections, conduct maintenance, and repair damage over the life of the Project. If problems are found during inspections, repairs will be performed, and the landowner will be compensated for damage that results.

In the limited areas where the Project is located within road ROW, the road authorities will continue to maintain the road ROW (e.g., mowing, ditch repair, etc.) and the maintenance provider will be responsible for maintenance of the transmission line (structures, conductors, etc.). The respective

maintenance responsibilities will be addressed in the utility permit, road use agreement, or some other type of agreement between the Applicants and the road authority.

Where the Project is located on private easements the maintenance provider will remove vegetation within the ROW that interferes with the O&M of the transmission line. Clearing needs are determined from regular ROW inspection, and vegetation maintenance typically occurs every four years.

Because the Project will not be constructing or expanding any new substations, substation maintenance is not expected to change substantially as a result of the Project. A certain amount of maintenance would be required at substations to ensure proper operation within NESC and NERC standards. Transformers, circuit breakers, batteries, protective relays, and other equipment would need to be serviced periodically in accordance with the manufacturer's recommendations. The substations must be kept free of vegetation, and adequate drainage must be maintained.

As noted above, transmission lines are very reliable. Scheduled maintenance outages are infrequent and are coordinated with the grid operator in advance. Most service interruptions are momentary. However, unplanned outages may occur for a variety of reasons, typically related to mechanical failure, or weather conditions such as heavy ice, wind, or lightning. Both Xcel Energy and GRE have crews distributed across southern Minnesota to respond rapidly to outage events.

3.4 Project Cost and Schedule

The Applicants estimate the total cost for the Project of approximately $102.1 million.[16]

Table 4. Estimated Project Cost

Segment	Component	Cost ($ million)
Western Segment	Second Circuit (includes reconfiguring in- and out-tap at Steep Bank Lake Substation)	$42.9
	Brookings County Substation Upgrade	$4.0
	Lyon County Substation Upgrade	$11.0
	Western Segment Total	$57.9
Eastern Segment	Second Circuit (includes Chub Lake Substation transmission line reroute)	$29.9
	Helena Substation Upgrade	$3.70
	Hampton Substation Upgrade	$10.6
	Eastern Segment Total	$44.2
Project Total		**102.1**

[16] CN Application, at pp. 20-21

The Applicants estimate inspection costs for the Original Brookings Line to approximately $75-$100 per mile for annual aerial inspections and approximately $200-$400 per mile for the ground inspections. The Applicants estimate that the addition of a second circuit would increase these inspection costs by 10 – 20 percent. Actual line-specific maintenance costs vary depending on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

Depending on permit requirements, the Applicants anticipate that construction activities along the Western Segment will occur from spring through September 2024 and construction of the Eastern Segment between April and September 2025.[17]

[17] Adapted from MA Application, Table 1-1, at p. 3

4 Proposed Project - Human and Environmental Impacts

This section discusses potential human and environmental impacts from the Project, along with possible strategies to avoid, minimize, and mitigation those impacts. Where applicable, this section references conditions in the route permit issued by the Commission in 2010 to Great River Energy and Xcel Energy for the Original Brookings Line (Original Brookings Permit) that can minimize impacts from the Project. For ease of reference, the text of the Original Brookings Permit is included as Appendix C.

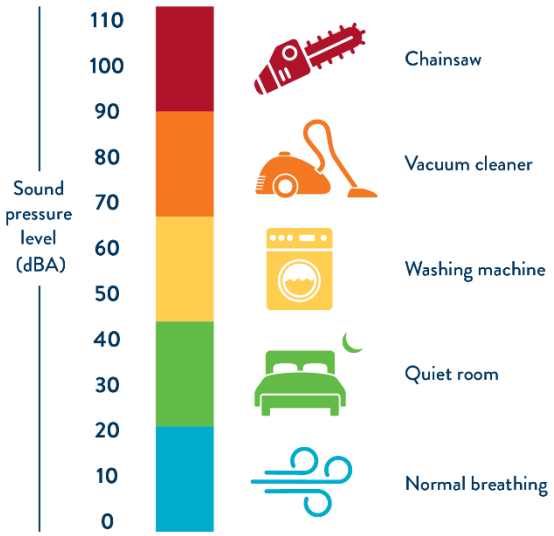
4.1 Human and Social Environment

Large energy projects have the potential for effects real or perceived on a local area, including impacts to human, community, and social environments. The human setting into which the Project is being proposed is rural and predominately agricultural. Potential impacts from the Project are associated with construction and operation.

4.1.1 Noise

Noise can be defined as any undesired sound. 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.[18] 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.[19]

Figure 5. Common Noise Levels



In Minnesota, noise standards are based on noise area classifications ("NAC") corresponding 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

[18] MPCA. *A Guide to Noise Control in Minnesota.* (2015). https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.

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

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. L_{10} may be exceeded 10 percent of the time, or six minutes per hour, while L_{50} may be exceeded 50 percent of the time, or 30 minutes per hour. Standards vary between daytime and nighttime hours. Table 5 provides current Minnesota noise standards.

Table 5. Minnesota 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

Construction

During construction temporary, localized noise from helicopters, heavy equipment, increased vehicle traffic, and construction activities will occur along the route during daytime hours. Because the bulk of the Project will not require installation of new structures, the construction noise associated with the installation of the second circuit will primarily be from helicopters. In areas where new structures will be installed (the Steep Bank Lake and Chub Lake substations and the area south of the Airlake Airport), construction noise will be more typical of general construction projects.

Construction noise could temporarily affect residences, schools, businesses, etc., that are close to the Project. Residences are the closest noise receptors to the transmission line ROW. Section IV.B.5 of the route permit for the Original Brookings Line requires that construction and routine maintenance be scheduled during daytime hours to ensure that nighttime noise standards will be met.

Operation

Audible noise from electric power lines is created by small electrical discharges at specific locations along the surface of the conductor that ionize surrounding air molecules. This phenomenon is known as corona and sounds like a crackling sound. In general, any imperfection on the surface of the conductor might be a source for corona. Examples include dust and dirt, or nicks and burrs from construction. Resulting noise levels are dependent upon voltage level (corona noise increases as voltage increases) and weather conditions. In foggy, damp, or rainy conditions, audible corona noise is common. In light rain, dense fog, snow or other relative moist conditions, corona noise might be higher than rural background levels. In heavy rain, corona noise increases even more, but because background noise increases too, corona noise is undetectable. During dry weather, corona noise is less perceptible.

The Applicants model estimated L_{50} noise levels during rainy weather to be approximately 50.6 dBA at the edge of the ROW, compared to 47.8 dBA as it operates currently. The model showed a maximum noise level of 49.8 dBA at the nearest residence, located approximately 87 feet from the centerline, (12 feet from the edge of the ROW).[20] Because the incremental increase in noise from the addition of the second circuit is less than three dBA, the increased potential noise is not anticipated to be perceptible. As the rain itself will create a noise level of approximately 50 dBA, the noise created by the transmission line under rainy weather would not be perceptible. Thus, under all weather conditions, noise impacts from the Project are anticipated to be minimal.

Noises associated with a substation result from the operation of transformers and switchgear. Transformers produce a consistent humming sound, resulting from magnetic forces within the transformer core. This sound does not vary with transformer load. Switchgear produces short-term noises during activation of circuit breakers. These activations are infrequent.

In sum, noise impacts from operation of the additional circuit are anticipated to be minimal and within Minnesota's noise standards.

4.1.2 Aesthetics

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.

The Project is primarily located in rural areas of southwestern and southeastern Minnesota. The existing landscape is characterized by flat or rolling agricultural fields, scattered rural residences and farm buildings, clusters of rural residences, county and township roads, transmission lines (including the Original Brookings Line), and substations.

For most of the length of the Project, the visual change will be limited to a second set of conductors on existing double-circuit capable transmission structures (Figure 6). Although the second set of conductors will be new, the overall impact will result in an incremental change.

[20] MA Application, at pp. 24-25

The Project will introduce 11 new structures to the existing landscape; the new structures will have comparable dimensions to the existing structures that comprise the Original Brookings Line (structure heights of 130 - 175 feet for the new structures near the Steep Bank Lake and Chub Lake substations and 90 - 110 feet for the eight additional structures south of the Airlake Airport). Changes to substations will be within the existing fenced area of the substations and will not be noticeable outside the substations.

Figure 6. Double Circuit Structure

The Project's design minimizes aesthetic impacts by making use of existing structures, minimizing the need for new structures., and not expanding the footprint of existing substations No additional mitigation is proposed.

4.1.3 Displacement

The National Electric Safety Code (NESC) establishes minimum clearance zones from power lines. In some cases, utilities may acquire easement rights to provide for extra clearances more than NESC minimum standards.

For electrical safety code and maintenance reasons, residences and other buildings are not allowed within the ROW of a transmission line. Any residences or other buildings located within a proposed ROW are generally removed or displaced. Displacements are relatively rare and are more likely to occur in more populated areas where it may not be feasible to avoid all residences and businesses.

The Project will not result in displacement of any businesses or residences.

4.1.4 Socioeconomic Impacts

The Applicants estimate that approximately 60 - 80 construction workers will be required for each segment. These workers will be in the project area from approximately six months.[21] The presence of these workers will likely result in a small short-term benefit to local economies as workers will spend money on food, lodging and other services and supplies in the project area. The Project will not require any permanent positions once it becomes operational.

[21] CN Application at p 79

The Project will result in temporary impacts to agricultural fields during construction. Crop production in temporary workspaces along the Original Brookings Line will be temporarily interrupted for one growing season (2024 along the Western Segment and 2025 along the Eastern Segment). The small and localized impacts to agricultural production are not expected to result a discernable impact to agricultural-related businesses., such as farm dealerships, seed dealers, and dealers of agricultural inputs such as fertilizer and pesticides, in the area.

Some local governments have recently experienced declines in production tax revenues due to generation curtailments resulting from congestion on the electric grid.[22] To the extent the Project reduces grid congestion, curtailments may be reduced, potentially resulting in a more stable ongoing revenue stream for jurisdictions that rely on production tax revenues from wind generation.

4.1.5 Archaeological, Historic, and Cultural Resources

Cultural resources, including archaeological and historic artifacts and features, contribute to the record of human occupation and alteration of the landscape. Archaeological resources include historic and prehistoric artifacts, structural ruins or earthworks and are often partially or completely below ground. Historic resources include extant structures, such as building and bridges, as well as districts and landscapes.

Archaeological resources could be impacted by the disruption or removal of such resources during the construction of a transmission line. Historic resources could be impacted by the placement of a line in a manner that impairs or decreases the historic value of the resource.

To determine potential impacts on cultural resources, known archaeological and historic sites in the project area were identified by the Applicants through a search of agency records within one mile of the Project. The Minnesota State Historic Preservation Office (SHPO) maintains records of known archaeological and historic resources in the state. These resources are typically identified through surveys conducted for projects that require compliance with Section 106 of the National Historic Preservation Act, or through state sponsored research initiatives.

The literature search did not identify any recorded archaeological or historic sites within the temporary workspace of the Western Segment. The literature search did identify one archaeological site and two alpha sites that may be within temporary workspaces associated with the Eastern Segment.
Prudent siting and routing to avoid impacts to archaeological and historic resources is the preferred mitigation. Section IV.J.2 of the Original Brookings Permit (Appendix C) requires GRE and Xcel Energy (the Permittees) to make every effort to avoid impacts to identified archaeological and historic resources and to consult with SHP and other parties if an impact will occur. The Applicants indicate they will follow SHPO's recommendations for additional surveys or other mitigation following SHPO's review of the Phase Ia Cultural Resource Review.

[22] See, e.g., Hughlett, Mike, *Powerline congestion leads to wind turbine shutdowns, denting county budgets*.. MINNEAPOLIS STAR TRIBUNE, July 25, 2022. https://www.startribune.com/power-line-congestion-leads-to-wind-turbine-shutdowns-denting-county-budgets/600187596/?refresh=true

4.1.6 Zoning and Land Use Compatibility

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.

Though local zoning and land use rules are superseded by the Commission's decisions,[23] the 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."[24]

The Project will not result in appreciable land use changes. Impacts to planning and zoning are anticipated to be negligible, and no mitigation is proposed.

4.1.7 Transportation and Public Services

Large energy projects can impact public services, such as roads, airports, water, wastewater, electric transmission and distribution, and emergency services. These impacts are usually temporary, for example brief scheduled power outages while the transmission line is connected to the grid or for scheduled maintenance. Impacts can be long-term if they change the area in a way that precludes or limits public services.

4.1.7.1 Roads

Transmission projects impacts to roads are typically temporary in nature during the construction process, e.g., temporary road closures or lane restrictions. However, impacts could be more long term if they change the project area in such a way that future options, such as road improvements, are foreclosed or limited. Existing road infrastructure along the Project primarily consists of paved and unpaved county and township roads, and Minnesota and U.S. highways. The Project crosses, but does not parallel, Interstate 35. Short-term temporary and localized impacts to roadways are expected during construction. The Project is not anticipated to have impacts to roads once operational. Section IV.B.3 of the Original Brookings Permit (Appendix C) requires the Permittees to cooperate with local road authorities to develop appropriate mitigation measures (e.g., signage, construction scheduling, use of guard structures, traffic control measures) to minimize impacts to roads and traffic from construction.

4.1.7.2 Airports

The addition of the eight new structures south of the Airlake Airport will allow the Project to comply with FAA requirements by continuing with the horizontal configuration on low-profile structures near the airport.

[23] Minnesota Statutes, 216E.10, subd. 1
[24] Minnesota Statutes 216E.03, subd. 7

4.1.7.3 Water and Wastewater

Impacts to water and wastewater services are not anticipated, as the Project will not require installation of either a well or septic system. Any new structures will be located within, or very near, the existing transmission ROW and away from household wells and septic systems.

4.1.7.4 Electric Utilities:

Construction of the Project will require de-energizing the existing circuit along each segment during construction to ensure worker safety. The Applicants have schedule construction during the spring and summer construction season to minimize temporary outages. Consistent with Midwest System operator (MISO) requirements, the Applicants will notify MISO or any scheduled outages at least 90 days in advance. Once operational, the Applicants contend that the Project will improve grid reliability.

4.1.8 Communications and Electronic Interference

Under typical operating conditions transmission lines do not cause radio or television interference. Interference associated with electrical infrastructure is related with a phenomenon known as corona. Corona is the result of small electrical discharges at discrete locations along the surface of a conductor that ionize surrounding air molecules. These discharges generate radio frequency noise. If the radio frequency noise is excessive relative to the strength of the broadcast signal it can interfere with signal reception. Additionally, structures might block line-of-sight communication signals.

Any radio interference would likely occur in the AM frequency range directly underneath or close to the conductors within the ROW. Negligible impacts might occur when vehicles or equipment pass underneath the HVTL at road crossings. Interference is not expected to FM radio signals, emergency services signals (Allied Radio Matrix for Emergency Response (ARMER) system), television, wireless internet, or cellular phones as these operate at frequencies higher than corona generated noise.

The Project is not anticipated to create communications or electronic interference.

Global positioning systems (GPS) use satellite signals to determine locations on the earth's surface and are commonly used to guide agricultural operations. Because GPS uses multiple digital satellite signals, any obstruction would be temporary and interference with the signals or subsequent uses is not anticipated.

Impacts to AM radio frequencies can be avoided by increasing the distance between the receiver and the HVTL or by increasing signal strength through antenna modifications. In situations where a HVTL does cause electronic interference, Section IV.G.3 of the Original Brookings Permit (Appendix C) requires the Permittees to remedy any interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices caused by the presence or operation of the transmission line.

4.1.9 Public Health and Safety

Construction and operation of large energy facilities may have the potential to impact human health and safety. This section discusses potential health and safety concerns related to both construction and operation of the Project.

4.1.9.1 Public Safety and Emergency Services

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

Electrocution is perhaps the most significant risk with electric transmission. When working near power lines, for example, using heavy equipment, an electrical contact can occur "even if direct physical contact is not made, because electricity can arc across an air gap."[25]

The most recent data available for injuries and fatalities associated with North American Industry Classification System Code No. 237130 *Power and Communication Line and Related Structures Construction* show that in 2020 there were 1,720 reported nonfatal occupational injuries and illnesses involving days away from work. Workers in this classification have a somewhat lower overall injury rate than workers as a whole (80.1 compared to 120.7), but a higher rate of falls (25.9 incidents per 10,000 fulltime workers, compared to 21.7 for all classifications), transportation (5.2 compared to 4.2), animal or insect related (8 compared to 1.2).[26] In 2021, 29 fatal injuries occurred to workers in this industry, most associated with transportation (roadway accident or being struck by a vehicle) or exposure to harmful substances.[27]

The proposed transmission line will be equipped with switching devices (circuit breakers and relays located in the substations where the transmission lines terminate). These devices are intended to make, carry, and break line currents under normal conditions and in specified abnormal conditions such as a short circuit or fault. The circuit breakers stop the specified current and can protect other equipment and the extended power system from damaging currents and more extensive outages; however, any electrical facility which becomes isolated by operation of circuit breakers should not be considered de-energized or safe. Downed power lines and other damaged electrical equipment should always be assumed to be energized and dangerous.

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[25] U.S. Bureau of Labor Statistics (USBLS) (2019) *Graphics for Economic News Release: Fatal occupational injuries by event*, https://www.bls.gov/charts/census-of-fatal-occupational-injuries/fatal-occupational-injuries-by-event-drilldown.htm

[26] USBLS (2023) Table R8 *Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full time workers*. https://www.bls.gov/iif/nonfatal-injuries-and-illnesses-tables/case-and-demographic-characteristics-table-r8-2020.htm

[27] USBLS (2022) *TABLE A-1. Fatal occupational injuries by industry and event or exposure, all United States, 2021,*: https://www.bls.gov/iif/fatal-injuries-tables/fatal-occupational-injuries-table-a-5-2021.htm

Potential impacts to emergency services are anticipated to be negligible. Emergency services are provided by local law enforcement and emergency response agencies located in Lincoln, Lyon, Scott, and Dakota counties and in nearby communities. Local emergency services would respond to any construction accidents. Project construction is not anticipated to directly affect emergency services in the project area. No road closures are planned, although there may be temporary delays associated with guide vehicles or minor detours. If road closures cannot be avoided, any temporary road closures would be coordinated with local jurisdictions to ensure that safe alternative access is available for emergency vehicles. Due to the relatively small number of construction workers on the project, the existing emergency services should have sufficient capacity to respond to any emergencies.

Construction is bound by federal Occupational Safety and Health Administration (OSHA) and state requirements for worker safety, and must comply with local, state, and federal regulations regarding installation of the facilities and qualifications of workers. 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. Construction crews must comply with local, state, and federal regulations when installing the project. Standard construction-related health and safety practices typically include safety orientation and training, as well as daily/weekly safety meetings.

4.1.9.2 Electromagnetic Fields

Electromagnetic fields (EMFs) are invisible forces that result from the presence of electricity. They occur naturally and are caused by weather or the geomagnetic fields. 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.

Voltage on a conductor creates an electric field that surrounds and extends from the wire. Using water moving through a pipe as an analogy, voltage is equivalent to the pressure of the water moving through the pipe. The strength of the electric field is measured in kilovolts per meter (kV/m). Electric fields decrease rapidly as they travel from the conductor and are easily shielded or weakened by most objects and materials.

Current moving through a conductor creates a magnetic field that surrounds and extends from the wire. Using the same analogy, current is equivalent to the amount of water moving through the pipe. The strength of a magnetic field is measured in milliGauss (mG). Like electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases; however, unlike electric fields, magnetic fields are not easily shielded or weakened.

Table 6 provides examples of electric and magnetic fields associated with common household items. "The strongest electric fields that are ordinarily encountered in the environment exist beneath high voltage transmission lines. In contrast, the strongest magnetic fields are normally found very close to

motors and other electrical appliances, as well as in specialized equipment such as magnetic resonance scanners used for medical imaging."[28]

Table 6. Electric and Magnetic Field Strength of Common Household Objects[29]

Electric Field*		Magnetic Field**			
Appliance	kV/m 1 foot	Appliance	mG		
			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

Health Studies In the late-1970s, epidemiological studies indicated a weak association between childhood leukemia and ELF-EMF levels. "Epidemiologists observe and compare groups of people who have had or have not had certain diseases and exposures to see if the risk of disease is different between the exposed and unexposed groups but does not control the exposure and cannot experimentally control all the factors that might affect the risk of disease."[30]

[28] World Health Organization. (2016). *Radiation: Electromagnetic Fields, What are typical exposure levels at home and in the environment?* https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields

[29] Ibid.

[30] National Institute of Environmental Health Sciences (2002). *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power.* https://www.niehs.nih.gov/health/materials/electric_and_magnetic_fields_associated_with_the_use_of_electric_power_questions_and_answers_english_508.pdf

Ever since, researchers have examined possible links between ELF-EMF exposure and health effects through epidemiological, animal, clinical, and cellular studies. To date, "no mechanism by which ELF-EMFs or radiofrequency radiation could cause cancer has been identified. Unlike high-energy (ionizing) radiation, EMFs in the non-ionizing part of the electromagnetic spectrum cannot damage DNA or cells directly," that is, the ELF-EMF that is emitted from HVTLs does not have the energy to ionize molecules or to heat them.[31] Nevertheless, they are fields of energy and thus have the potential to produce effects.

"The few studies that have been conducted on adults show no evidence of a link between EMF exposure and adult cancers, such as leukemia, brain cancer, and breast cancer."[32] "Overall there is no evidence that exposure to ELF magnetic fields alone causes tumors. The evidence that ELF magnetic field exposure can enhance tumor development in combination with carcinogens is inadequate."[33]

"A number of scientific panels convened by national and international health agencies and the U.S. Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe."[34]

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. In 2002, 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 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.[35]

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[31] National Cancer Institute (2016). *Magnetic Field Exposure and Cancer*. http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/magnetic-fields-fact-sheet.
[32] National Institute of Environmental Health Sciences. (2018). *Electric and Magnetic Fields* http://www.niehs.nih.gov/health/topics/agents/emf/index.cfm.
[33] World Health Organization. (2007). *Extremely Low Frequency Fields*.. http://www.who.int/peh-emf/publications/Complet_DEC_2007.pdf?ua=1, page 10.
[34] State of Minnesota, State Interagency Working Group on EMF Issues (2002) *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*, https://apps.commerce.state.mn.us/eera/web/project-file?legacyPath=/opt/documents/EMF%20White%20Paper%20-%20MN%20Workgroup%20Sep%202002.pdf:
[35] *Id*., page 36.

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. For example, Florida limits electric fields to 2.0 kV/m and magnetic fields to 150 mG at the edge of the ROW for 161 kV transmission lines.[36] Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (Table 7). The Commission limits the maximum electric field under high voltage transmission lines in Minnesota to 8.0 kV/m. It has not adopted a standard for magnetic fields.

Table 7. International Electric and Magnetic Field Guidelines

Organization	Electric Field (kV/m)		Magnetic Field (mG)	
	Public	Occupational	Public	Occupational
Institute of Electrical and Electronics Engineers	5.0	20.0	9,040	27,100
International Commission on Non-Ionizing Radiation Protection	4.2	8.3	2,000	4,200
American Conference of Industrial Hygienists	—	25.0	—	10,000 generally and 1,000 for persons with cardiac pacemakers or other medical electronic devices
National Radiological Protection Board	4.2	—	830	4,200

Potential impacts from the Project are anticipated to be negligible and are not expected to negatively affect human health.

The Applicants estimate the maximum electric field level within the transmission ROW will increase from 3.7 kV/m as it currently operates to 5.2 kV/m at one meter above ground along both segments.[37] Electric fields decrease with distance and modeling estimates a maximum electric field of 0.4 kV/m at the edge of the ROW.[38] Even with this increase from the addition of the second circuit, the estimated electric fields are well under the Commission's electric field limit of 8.0 kV/m.

The maximum magnetic field level within the ROW under typical operating condition is estimated to decrease from 266 mG to 188 mG for the Western Segment and from 209 mG to 178 mG along the Eastern Segment. directly under a conductor at a double circuit structure. Magnetic fields decrease with distance, and the maximum modeled magnetic field under typical operating conditions at the edge of the transmission ROW (75 feet either side of the center line) are anticipated to be no greater than 47-48 mG for the double circuit poles along the majority of the line and up to 97 mG along a portion of the

[36] Florida Department of State. (2008). *Rule 62-814.450 Electric and Magnetic Field Standards*. https://www.flrules.org/gateway/ruleNo.asp?id=62-814.450.
[37] CN Application, at p. 116, see also Xcel Energy, Comment, January 3, 2024, eDocket No. 20241-201814-01
[38] CN Application, at pp. 70-71; MA Application, Appendix B, Tables 7 and 9

Western Segment, where the line parallels an East River Electric Cooperative 115 kV transmission line.[39] Potential health impacts from these magnetic field levels are anticipated to be negligible.

The Applicants will design, construct, and operate the Projects in accordance with applicable codes, manufacturer specifications, and required setbacks. Because no impacts due to EMF are anticipated, no additional mitigation measures are proposed.

4.1.9.3 Stray Voltage

In general terms, stray voltage is a low-level voltage that can be found between two contact points at any property where electricity is grounded. Stray voltage encompasses two phenomena: neutral-to-earth voltage (NEV) and induced voltage.[40]

Neutral-to-Earth Voltage NEV is a type of stray voltage that can occur where distribution lines enter structures. NEV is typically associated with distribution lines and electrical service at a residence or on a farm. Both the electrical systems at farms and utility distribution systems are grounded to the earth to ensure safety and reliability. Some current will flow through the earth at each point where the electrical system is grounded and a small voltage develops. If NEV is prevalent in an agricultural operation it can affect livestock health. This concern has primarily been raised on dairy farms because of its potential to affect milk production and quality.

Induced Voltage The electric field from a transmission line can extend to nearby conductive objects, for example, farm equipment, and induce a voltage upon them. If these conductive objects are insulated or semi-insulated from the ground and a person touches them, a small current will pass through the person's body to the ground. This may be accompanied by a spark discharge and mild shock like what can occur when an individual walks across a carpet and touches a grounded object or another person. The primary concern with induced voltage is not the voltage, but rather the current that flows through a person to the ground when touching the object.

Transmission lines do not create stray voltage as they do not directly connect to businesses, residences, or farms. Transmission lines can induce voltage on a distribution circuit that is parallel and immediately under the transmission line. Problems related to distribution lines can be managed by correctly connecting and grounding electrical equipment. To address stray voltage, electrical systems, including farm systems and utility distribution systems, must be adequately grounded to the earth to ensure continuous safety and reliability, and to minimize this current flow.

Section IV.G of the Original Brookings Permit (Appendix C) requires the Permittees to design, construct, and operate the Original Brookings Line consistent with NESC standards and Commission limits on electric fields. To ensure safety in the proximity of transmission lines, the NESC requires that any discharge be less than five milliAmperes. In addition, the Commission's electric field limit of 8 kV/m is

[39] MA Application, Appendix B, Tables 10 and 12
[40] Wisconsin Public Service Corporation. (2011). Answers to Your Stray Voltage Questions: Backed by Research,. https://www.wisconsinpublicservice.com/partners/agriculture/stray-voltage/pdf/stray-voltage.pdf , page 1

designed to prevent serious shock hazards due to induced voltage. Proper grounding of metal objects under and adjacent to transmission lines is the best method of avoiding these shocks.

4.1.10 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to environmental law and policies. Environmental justice is intended to ensure that all people benefit from equal levels of environmental protection and have the same opportunities to participate in decisions that may affect their environment or health. Environmental justice concerns are raised when a proposed project differentially impacts specific communities, e.g., placing a project that releases pollutants in a low-income neighborhood.

Minnesota Statute 216B.1691, subd. 1 (e) defines an environmental justice area an area in Minnesota that, based on the most recent data published by the United States Census Bureau, meets one or more of the following criteria.

1) 40 percent or more nonwhite populations

2) 35 percent or more households with income ≤ 200 percent of the poverty level

3) 40 percent or more residents with limited English proficiency, or;

4) Indian country.

The Applicants prepared an environmental justice analysis for the Project using data from the U.S. Census American Community Survey five-year estimates. The Applicants compared the percentage of the total minority and low-income populations for each Block Group (a statistical division of a census tract, the population of a block group typically ranges from 600 – 3,000) that the Project intersected. The Applicants identified two Block Groups as potentially meeting the criteria for identification as an environmental justice area

Commerce staff used the US EPA's Environmental Justice Screening Tool (EJ Screen)[41] to evaluate the project area and its associated census tracts to determine whether there may be disproportionate adverse human health or environmental effects on these populations. The EJ Screen confirmed that Census Tract 3605, Block Group 2 in Lyon County (encompassing the northwestern portion of Marshall and portions of Fairview Township) meets the statutory definition of an environmental justice area, as 60 percent of its population reports income of less than 200 percent of the poverty level. Although this Block Group does have a relatively high percentage of non-white population (36 percent) compared to the larger Lyon County area (15.7 percent), it does not meet the statutory requirement for an environmental justice area for that criterion. The EJ screening tool indicated that neither Census Tract 615.01, Block Group 1 nor Block Group 2 (portions of Eureka and Castle Rock Townships in Dakota County) met the statutory environmental justice criteria for poverty (12 and 27 percent, compared to

[41] U.S. Environmental Projection Area. *EJ Screen, Environmental Justice Screening and Mapping Tool*, https://www.epa.gov/ejscreen

the 35 percent threshold) or non-white population (six and four percent, compared to the 40 percent threshold).

Although a temporary workspace does extend into the northwestern corner of Census Tract 3605, Block Group 2, no new poles will be installed in that location and the Project's construction and operation impacts to that area would be minimal and related to the installation of the second circuit on existing structures. Therefore, the Project will not have disproportionately high and adverse human health or environmental effects on low-income, minority, or tribal populations. Mitigation is not proposed.

4.2 Impacts to Land -Based Economies

Large electric facilities have the potential to impact land-based economies. This section discusses potential impacts to agriculture, forestry, mining, and recreation and tourism from construction and operation of the Project.

4.2.1 Agriculture

The Project will result in temporary impacts to agricultural fields during construction. Crop production in temporary workspaces along the Original Brookings Line will be temporarily interrupted for one growing season (2024 along the Western Segment and 2025 along the Eastern Segment). The small and localized impacts to agricultural production are not expected to result a discernable impact to agricultural-production.

The Applicants state they will maintain landowner access to agricultural fields, storage areas, structures and other facilities to the extent practicable during construction and will compensate landowners for adverse impacts, including crop damage or production losses, resulting from the Project. Adverse impacts could include production loss or damage to agricultural land or infrastructure (e.g., soil compaction, damage to irrigation systems or drain tile). The Applicants state that they will compensate landowners for crop damage from construction and operation of the Project.[42] The Original Brookings Permit includes an Agricultural Impact Mitigation Plan. The Applicants have indicated they may revise the older Agricultural Impact Mitigation Plan, and the Minnesota Department of Agriculture has indicated its approval of the revised plan.[43]

Livestock operations located near the Project could be temporarily affected during construction (e.g., disturbances to livestock due to construction noise. Although stray voltage impacts to animal agriculture is often raised as a concern with HVTLs, HVTLs do not create stray voltage. Stray voltage is discussed in Section 4.1.9.3.

[42] MA Application, at pp. 37-38, CN Application, at pp.111-112
[43] Minnesota Department of Agriculture, Comment, November 15, 2023, eDocket No: 202311-200525-01

4.2.2 Forestry

The Project will not impact forestry operations. Because the Project would be constructed within or adjacent to the Original Brookings Line ROW, any tree removal would be negligible and there are no commercial timber companies or other forestry operations within or immediately adjacent to the Original Brookings Line ROW.

4.2.3 Mining

The Project may result in very minor increases to short-term demand for sand and aggregate for construction related to the 11 new structures. Project demands will not lead to new mines or the expansion of existing mining operations. The Original Brookings Line was located to avoid direct impacts to existing and reasonably foreseeable mining operations and there are no commercial mining operations within or immediately adjacent to the Original Brookings Line ROW.[44] Impacts to mining will not occur and no mitigation is proposed.

4.2.4 Tourism and Recreation

Tourist activities within the Project area are largely related to outdoor recreational activities such as hunting, snowmobiling, hiking, biking, boating, fishing, and nature observation. The Project generally avoids identified snowmobile trails, hiking trails, bike trails state and local parks, Wildlife Management Areas (WMAs), and Scientific and Natural Areas (SNAs).[45]

The Original Brookings Line crosses U.S. Highway75, denoted King of Trails, an historic highway that formerly ran from Canada to the Gulf of Mexico.[46] The Project will add an additional conductor over the highway, although there may be temporary impacts during construction, with standard best management practices (BMPs) including temporary guard or clearance poles will be used to ensure that conductors do not obstruct or otherwise interfere with traffic, the Project will not impact the function of the highway or the experience of travelers.

There is one Minnesota Walk-In Access (WIA) easement in a wetland restoration area within a temporary workspace located along the Western Segment in Lincoln County.[47] WIA program provides public hunting opportunities on private land that is enrolled in a conservation program or has high quality natural cover. Landowners may choose to enroll their land is administered by DNR. Under the WIA program, landowners' liability is limited and DNR conservation officers handle trespassing and hunting violations. Individuals with WIA validation can hunt from September 1 to May 31 during legal hunting season without directly contacting the landowner.[48] Mitigation measures could include

[44] CN Application, at p. 112
[45] MA Application, at p. 51
[46] MA Application, at pp. 38-39
[47] CN Application, at pp. 110
[48] DNR, *Walk-In Access Program*, https://www.dnr.state.mn.us/walkin/index.html

scheduling construction in this area to avoid the hunting season to avoid impacts to workers in the area and ensure access to the WIA for hunters.

4.3 Natural Resources

Large electric facilities have the potential to impact natural resources, including flora, fauna, habitat, soils, and water. This section discusses potential impacts to natural resources from construction and operation of the Project.

4.3.1 Ecological Setting

Prior to European settlement, Dakota and Ojibwe peoples occupied lands in the future state of Minnesota. "Dakota and Ojibwe cultures arise from an intimate knowledge of place, from personal, local connections among people and the rest of the natural world. Ojibwe and Dakota languages, family and political structures, traditional economies, and spirituality arose from and were shaped by the landscape through which people walk."[49]

The DNR and the U.S. Forest Service have developed an Ecological Classification System for ecological mapping and landscape classification in Minnesota.[50] Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The system uses associations of biotic and environmental factors, including climate, geology, topography, soils, hydrology, and vegetation. The classification system enables resource managers to consider ecological patterns for areas as large as North America or as small as a single timber stand and identify areas with similar management opportunities or constraints relative to that scale (Figure 7).

The Project spans three Ecological Classification System sections, transitioning between the central grasslands and eastern forests of North America.

The Western Segment is located within the North Central Glaciated Plains section. This section was under tallgrass prairie preceding modern settlement. The segment spans the Coteau Moraines (251 Bb) and Minnesota River Prairie (251 Ba) subsections of the North Central Glaciated Plains Section.

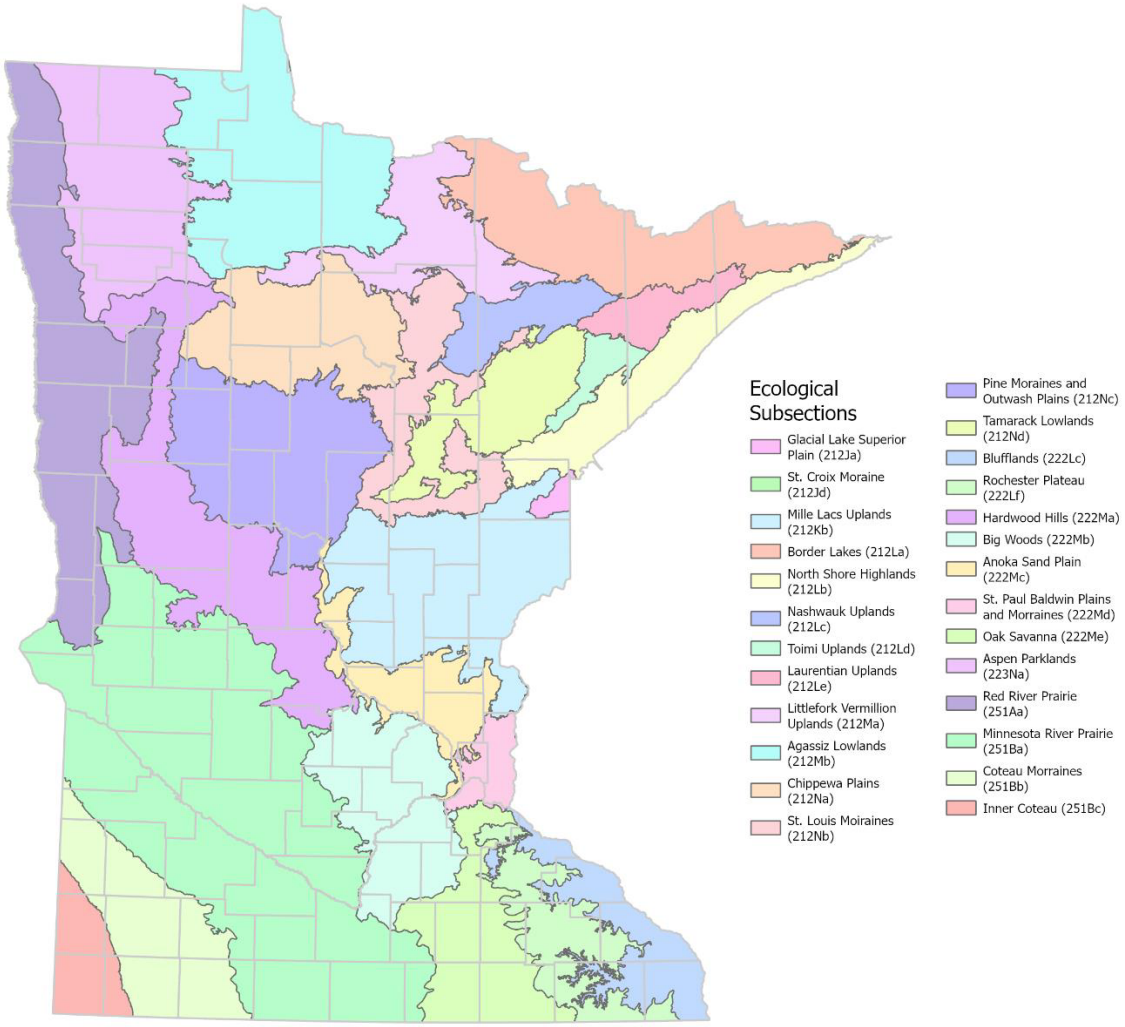
The Eastern Segment spans the Minnesota and Northeast Iowa Morainal and Paleozoic Plateau sections. This area transitions from the grassland areas to the west to more wooded areas in the east. The project spans the Big Woods (222Mb) and Oak Savanna (222 Me) subsections of the Minnesota and Northeast Iowa Morainal Section, and the easternmost segment of the segment is located in the Rochester Plateau (222L) subsection of the Paleozoic Plateau Section.

As a result of settlement and farming in the 1800s, most of the historic prairie has been converted to agriculture. The dominant plant species in the agriculture areas are corn (*Zea mays)* and soybeans (*Glycine max)*. In the grazed areas, dominant vegetation includes introduced grasses such as smooth

[49] Why Treaties Matter (n.d.) *Relations: Dakota and Ojibwe Treaties*, retrieved from: http://treatiesmatter.org/relationships
[50] DNR *Ecological Classification System*, http://www.dnr.state.mn.us/ecs/index.html

brome *(Bromus inermis)* and sorghum *(Sorghum vulgare).* Similarly, woodland trees were removed and much of the land was converted to agriculture.

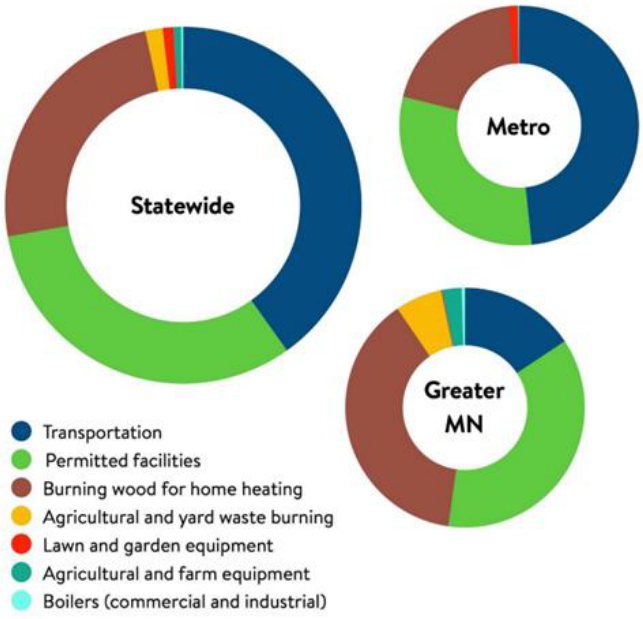
Figure 7. Minnesota Ecological Subsections



4.3.2 Air Quality

Air quality is a measure of how pollution-free the ambient air is and how healthy it is for humans, other animals, and plants. Greenhouse Gas emissions, along with other issues related to climate change and design for resilience are discussed in Section 4.3.8.

Figure 8. Air Pollution Sources by Type



Emissions of air pollutants will occur during construction and operation of new infrastructure for the project. Overall air quality in Minnesota has improved over the last 20 years, but current levels of air pollution still contribute to health impacts. As illustrated in Figure 8**,** today, most of our air pollution comes from smaller, widespread sources … the rest comes from a wide variety of things we use in our daily lives: our vehicles, local businesses, heating and cooling, and yard and recreational equipment".[51]

Minimal intermittent air emissions are expected during construction of the Project. 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. The transmission line will not generate criteria pollutants or carbon dioxide once operational.

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. Once operational, vehicles used during regular operations and maintenance activities (annual aerial inspection and ground inspections every four years) and emergency repair work will generate nominal emissions relative to general traffic in the project area. Exhaust emissions can be minimized by keeping vehicles and equipment in good working order, following equipment manufacturer-recommended operations, and not running equipment unless necessary.

All projects that involve movement of soil, or exposure of erodible surfaces, generate some type of fugitive dust emissions. The project will generate fugitive dust from travel on unpaved roads, grading,

[51] MPCA (2023) *The State of Minnesota's Air Quality, January 2023 Report to the Legislature*, https://www.lrl.mn.gov/docs/2022/mandated/221697.pdf

and excavation. Watering exposed surfaces, covering disturbed areas, and reducing speed limits on-site are all standard construction practices. Recent permits have included a special condition requiring permittees to minimize, and if possible, to avoid, chloride-based dust control chemicals. This permit condition is based on recent DNR recommendations for other energy facilities.

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.[52] 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.[53] The national ozone standard is 0.070 ppm over a 3-year average of the annual fourth-highest daily maximum eight-hour average concentration.[54] Ozone and nitrous oxide emissions are anticipated to be well below these limits. Minimal emissions will be associated with periodic maintenance activities.

4.3.3 Geology and Soils

The Western Segment is characterized by level to rolling terrain in a region of calcareous till deposited by the Des Moines lobe. Most of the Eastern Segment is characterized by rugged to hummocky moraines deposited along the eastern margin of the Des Moines ice lobe while the easternmost segment is characterized by level to gently rolling older till plains. While the easternmost portions of the Eastern Segment are located in an area with geology that may be suitable for karst formation, there are no known karst features within 2.5 miles of the Project. Because of the limited excavation involved, no impacts to karst feature are expected.[55]

Soils within the Western Segment are predominantly loams and clay loams with a slight to moderate erosion hazard rating. Soils within the Eastern Segment Project Area are predominantly loams, sandy loams, and clay loams with a slight to moderate erosion hazard rating.[56] Impacts to soils can be mitigated using standard BMPs to minimize erosion.

4.3.4 Vegetation

Transmission lines have the potential to impact vegetation through the removal or disturbance of vegetation or from soil compaction during construction and later during maintenance activities, possible introduction of noxious weeds or invasive species, or by changes in habitat (e.g., soils, water flows) that adversely impact plant growth.

Impacts to vegetation will be minimal and temporary. Placing the second circuit on existing structures minimizes overall impacts to vegetation. Direct effects to vegetation would occur from disturbance related to staging areas, construction access roads, and the locations of the 11 new structures. The

[52] EPA. *Ozone Pollution*. https://www.epa.gov/ozone-pollution.
[53] Minnesota Rule. part. 7009.0080.
[54] U.S. EPA. *National Ambient Air Quality Standards*. https://www.epa.gov/criteria-air-pollutants/naaqs-table.
[55] CN Application, at pp. 92-93
[56] MA Application, at pp. 64-69

Project will not result in significant changes to land cover, habitat fragmentation, or damage to ecological function. The Applicants have stated their intent to implement BMPs to curb the introduction of noxious weeds and invasive species from construction activities. These practices include:

- Cleaning equipment prior to starting construction,
- Early detection of invasive species,
- Limiting traffic through weed-infested areas, if possible,
- If unable to avoid weed infested areas, cleaning mowers and bladed equipment before moving to other sections of the Project Area, and
- Reseed non-agricultural areas with appropriate MnDOT seed mixes for roadsides, uplands, and/or wetlands as applicable. If landowners want specialized seed mixes used on their parcels, the Applicants will pay for those seed mixes.[57]

Operation of the Original Brookings Line occasionally creates localized temporary impacts to vegetation for maintenance activities. The easements for the Original Brookings Line allow the Permittees to trim or remove trees outside, but adjacent to, the easement in certain cases where a tree poses a risk of falling or otherwise interfering with the operation of the line.[58] No additional impacts beyond those currently created by maintenance of the Original Brookings Line are anticipated once the Project becomes operational.

4.3.5 Wildlife

Both resident and migratory wildlife such as birds, mammals, fish, reptiles, amphibians, and insects use the habitat in and adjacent to the Project for forage, breeding, and shelter. Historically, the areas surrounding the Project contained a variety of natural communities and habitat that supported diverse species of wildlife. As the historic vegetation has been converted to agricultural use, the wildlife species that occupy the landscape reflect the changes in habitat type and availability. The most common species tend to be generalists able to utilize rural, urban or agricultural habitats. Most migratory wildlife species are birds, including raptors and songbirds and migratory bat species.

Construction activities that generate noise, dust, or disturbance of habitat may result in short-term indirect impacts on wildlife. Many wildlife species would likely avoid the immediate area during construction activities; the distance that animals would be displaced depends on the species and the tolerance level of each animal. Because other suitable habitat is available in and near the Project, these temporary impacts to wildlife are not expected to cause permanent change in local populations. Once operational, impacts from the Project are not anticipated to significantly change.

[57] MA Application, pp. 48-49
[58] Xcel Energy, Comments, January 3, 2024, eDocket No: 20241-201814-01

Potential impacts to avian species include those described above. Additionally, birds—especially large-bodied birds—are susceptible to electrocution from, and collision with transmission lines during operation. Potential impacts to avian species are expected to be minimal due to minimal need for new structures. Both the Original Brookings Line and Project incorporate the spacing between conductors and between conductors and grounded hardware recommended by the Avian Power Line Interaction Committee (APLIC).[59]

The Project's use of existing ROWs minimizes habitat loss and fragmentation.

Section IV.J.3 of the Original Brookings Permit (Appendix C) is a special condition that required the Permittees to coordinate with USFWS and DNR on the placement of avian flight diverters. This section also requires the line to be designed using best management practices for conductor spacing and shielding as codified in Avian Power Line Interaction Committee standards.

There is a potential for small animals to become entangled in the plastic used in some erosion control measures such as plastic mesh netting or small plastic fibers used to add strength to hydro-mulch products. DNR recommends that erosion control methods avoid use of plastic components [60]Recently issued site and route permits have contained a special condition requiring use of wildlife-friendly or non-plastic materials.

4.3.6 Water Resources

4.3.6.1 Groundwater

Groundwater is the source of water for springs and wells and provides water for drinking, irrigation, and industrial uses. Groundwater can be sourced from shallow surficial aquifers or from deeper confined aquifers. Activities that reduce the quantity of available water or introduce contaminants into these aquifers can affect groundwater resources and the people and industries that rely on them.

Most groundwater originates from rain and melting snow and ice that infiltrate into the ground. Ground water in Minnesota is largely a function of local geologic conditions that determine the type and properties of aquifers. The Minnesota DNR divides the state into six ground water provinces based on bedrock and glacial geology.[61] The Project crosses five of the six provinces. The Western Segment is within the Western and Arrowhead/Shallow Bedrock Groundwater Provinces. The Eastern Segment is within the South-Central, East Central, and Karst Groundwater Provinces. The Western Province contains limited bedrock aquifers. Aquifers across the Arrowhead/Shallow Bedrock are limited. Sediment is thin or absent and mostly underlain by crystalline bedrock that has limited groundwater availability. The South-Central and Western Provinces are defined by fine grained glacial sediment with

[59] Avian Power Line Interaction Committee (APLIC). (2006). *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. https://www.nrc.gov/docs/ML1224/ML12243A391.pdf
[60] DNR Comment, December 27, 2023, eDocket No. 202312-201580-01
[61] DNR. *Minnesota Groundwater Provinces* 2021. https://files.dnr.state.mn.us/waters/groundwater_section/provinces/2021-provinces.pdf

limited surficial and buried sand aquifers. The South-Central Province contains good availability of bedrock aquifers. The Karst Province contains moderate surficial sands aquifers and productive bedrock aquifers.[62].

The Project's impacts to groundwater resources will be minimal. The Project may require temporary construction dewatering at the 11 new structure locations. Any construction dewatering would be minimal A water appropriations permit from the DNR is required if temporary dewatering activities exceed 10,000 gallons per day or 1,000,000 gallons per year.[63] If temporary dewatering is required during construction activities, discharge of dewatering fluid will be conducted under the National Pollutant Discharge Elimination System (NPDES) permit program and addressed by the Project's Storm Water Pollution Prevention Plan (SWPPP), as required.

While the easternmost portions of the Eastern Segment are in an area with geology that may be suitable for karst formation, there are no known karst features within 2.5 miles of the Project. Because of the limited excavation involved, no impacts to karst feature are expected.[64]

4.3.6.2 Surface Waters and Floodplains

The Western Segment is located in the Lac qui Parle River, Minnesota River-Yellow Medicine River and Redwood River watersheds in the Minnesota River Basin. The Eastern Segment is located within the and Lower Minnesota River Watershed in the Minnesota River Basin and the Mississippi-Lake Pepin watershed of the Lower Mississippi River Basin.[65]

Some watercourses and water bodies within the site are designated as public waters and are listed in the public waters inventory (PWI) by the State of Minnesota. Public waters are designated as such to indicate lakes, wetlands, and watercourses over which DNR has regulatory jurisdiction. Public waters are identified on PWI maps and are designated as public waters under DNR's Public Waters Permit Program (Minnesota Statute 103G.005, Subdivision 15).

The Project will span all rivers and streams. The Applicants have designed the Project to locate temporary work and staging areas away from PWIs to avoid impacts to PWIs. The Eastern Segment crosses 12 PWIs at 14 locations. Two temporary workspaces along the Eastern Segment will cross an intermittent PWI trout stream tributary t the South Branch Vermillion River, and another at an unnamed tributary to Bradshaw Lake.[66]

Because no structures will be located within rivers or streams, the Project will not result in direct impacts to rivers or streams. Potential impacts to surface waters from high voltage transmission lines are largely related to construction activities. During construction of the Project, there is the potential for

[62] CN Application, at p. 90
[63] DNR, Comment, December 27, 2023, eDocket No: 202312-201580-01
[64] CN Application, at pp. 92-93
[65] CN Application, at p 89, Figures 3a and 3b; DNR, Minnesota's Watershed Basins, https://www.dnr.state.mn.us/watersheds/map.html
[66] CN Application, at p. 90

sediment to reach surface waters due to ground disturbances from vegetation clearing, excavation, grading, and construction traffic. Potential impacts to surface water resources from construction could include erosion from increased surface water runoff, sedimentation, and discharges from groundwater dewatering. These impacts will be temporary during construction and will be minimized to the extent possible by using BMPs. In addition to standard construction BMPs, the Applicants consulted with the DNR to develop mitigation measures for the South Branch Vermillion River and its tributary. The Applicants have committed to not installing new structures near the streams, limiting clearing to the current ROW in this area, avoiding earthwork near the streams, and ensuring no in-water work in these areas.[67] Impacts to surface waters are expected to be negligible.

Floodplains are areas susceptible to flooding that are adjacent to rivers, streams, and lakes. In flat areas, the floodplain can extend more than a mile from the flooding source. Floodplains can also be the normally dry areas adjacent to wetlands, small ponds, or other low areas that cannot drain as quickly as the rain falls. The Applicants identified Federal Emergency Management Agency (FEMA) floodplain data and identified approximately 0.42 acres of temporary construction impacts within the 100-year floodplain associated with the South Branch Yellow Medicine River along the Western Segment. will be temporarily impacted during construction. Along the Eastern Segment, the Applicants identified temporary construction impacts of approximately 0.34 acres of the 500-year floodplain and 0.54 acres of the 100-year floodplain. The Applicants also identified approximately 0.001 acre of the 500-year floodplain along the Eastern Segment that would be permanently impacted by the installation of a structure. The Project will not impact the function of the floodplains.

4.3.6.3 Wetlands

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated during much of the growing season). Wetland types include marshes, swamps, bogs, and fens. Wetlands vary widely due to differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors.[68]

Wetlands are important to the health of waterways and communities that are downstream. Wetlands can be one source of hydrology in downstream watercourses and water bodies, detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetland health also has economic impacts because of their key role in fishing, hunting, agriculture, and recreation. These large infrastructure projects could temporarily or permanently impact wetlands if these features cannot be avoided through project design. During construction, temporary disturbance of soils and vegetative cover could cause sediment to reach wetlands which could in turn affect wetland functionality.

[67] MA Application, at p.
[68] USEPA (2022). *What is a Wetland* https://www.epa.gov/wetlands/what-wetland

Wetlands can be impacted directly or indirectly from construction activities (i.e., structure or substation locations) Direct impacts result from disturbances that occur within the wetland. Indirect impacts result from disturbances that occur in areas outside of the wetland, such as uplands or up-stream waterways.

Most of the wetlands along the Project area associated with streams and rivers. The Project will not directly impact any wetlands. The Original Brookings Line generally spans wetlands and none of the 11 new structures will be placed in wetlands. The Applicants have identified approximately three acres of wetland, mostly Palustrine (marshy) within the temporary workspaces.[69]

The preferred method for minimizing impacts to wetlands is to avoid disturbance of the wetland through a project's siting and design. In addition to avoidance, implementation of BMPs during construction significantly reduces the potential for wetland impacts due to erosion or runoff.

Section IV.B.9 of the Original Brookings Permit (Appendix C) requires that construction in wetland areas during frozen ground conditions where possible and use of mats in wetland areas if winter construction is not feasible. This condition also requires that soil excavated from the wetlands be contained and not placed back into the wetland area. Section IV.J.4 of the Original Brookings Permit requires Permittees to span rivers streams and wetlands where possible. Additional mitigation measures include minimizing travel through wetlands by using the shortest route possible and assembling structures in upland areas.

4.3.7 Rare and Unique Natural Resources

There are various governmental programs and agencies which provide resources to effectively evaluate potential environmental impacts of proposed activities.

The Minnesota Biological Survey (MBS) and the Minnesota Natural Heritage Information System (NHIS) provide information on federal and state listed species, Species of Greatest Conservation Need, and unique or rare habitat types in Minnesota. The MBS is an ongoing effort by the DNR to systematically collect, interpret, and monitor data on plant and animal distribution, native plant communities, and ecosystems. At the conclusion of the survey work in a geographic region, ecologists assign a biodiversity significance rank to each survey site. These ranks are used to communicate the statewide native biological diversity significance of each site to natural resource professionals, state and local government officials, and the public, and to help prioritize and guide conservation and management of these important resources. A site's biodiversity significance rank is based on the presence of rare species populations, the size and condition of native plant communities within the site, and the landscape context of the site (for example, whether the site is isolated in a landscape dominated by cropland or developed land, or whether it is connected or close to other areas with intact native plant communities).[70] The NHIS database provides information on Minnesota's rare plants, animals, native plant communities and other rare features. The NHIS is continually updated and is the most complete

[69] MA Application, at pp. 71-72
[70] DNR. *Minnesota County Biological Surveys*, http://www.dnr.state.mn.us/eco/mcbs/index.html

source of data on Minnesota's rare or otherwise significant species, native plant communities and other natural features.[71]

The USFWS provides information for use in National Environmental Policy Act documents, and reviews and provides comments on these documents. Through this process, the USFWS seeks to ensure that impacts to plant and animal resources are adequately described and necessary mitigation is provided. One such resource is the distribution lists of federally-listed threatened, endangered, and candidate species by county.

Northern long-eared bat *(Myotis septentrionalis)*

The Northern long-eared bat (NLEB) is a federally listed endangered species and state listed species of concern. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark or in cavities or crevices of both live and dead trees. The spread of white-nose syndrome across the eastern United States has become the major threat to the species. Activities that might impact this species include, but are not limited to, any disturbance to hibernacula and destruction or degradation of habitat (including tree removal).

Tricolored Bat (*Perimyotis subflavus*)

The tri-colored bat (TCB), also known as the easter pipistrelle, is a state-listed species of concern. The USFWS proposed listing the species as endangered in September 2022. The species is so named because the coat appears dark at the base, lighter in the middle, and dark at the tip. During the winter the species will hibernate in caves, mines and tunnels and has been found has been found regularly, though in low numbers, in caves and mines in the southeastern part of the state.[72] During the summer, tricolor bats generally roost singly, often in trees, while some continue roosting in their winter hibernaculum. the species roosts among live and dead leaf clusters or deciduous hardwood trees.

The Applicants' review of the MDNR NHIS licensed data did not indicate TBC species occurrences within or near the Project. The Project is primarily located in agricultural lands with only small, forested habitats; however, these small, forested habitats could contain potential bat habitat. The Applicants have designed the Project to avoid the need for tree clearing and has communicated its determination that there will be no effect to this species in its consultations with the USFWS.

Monarch Butterfly (Danaus plexippus)

The monarch butterfly is a federal candidate species. The species is common throughout Minnesota during summer months and is most frequently found in habitats where milkweed and native plants are

[71] DNR. *Minnesota Natural Heritage Information System Database*, http://www.dnr.state.mn.us/eco/nhnrp/nhis.html
[72] DNR, Rare Species Guide, *Perimyotis subflavus*) https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC03020

common, including roadside ditches, open areas, wet areas, and urban gardens.[73] The Applicants have determined the Project will have no effect on the species.

Prairie bush clover (Lespedeza leptostachya)

Prairie bush clover is a federally and state listed threatened species endemic to tall grass prairies of the upper Mississippi River Valley. Remaining occurrences of the species are generally restricted to remnant prairies.[74] The primary threat to the species is habitat loss, land conversion, and encroachment of non-native and invasive species. A review of DNR's Native Prairie database identified one native prairie crossed by the existing Western Segment and several adjacent native prairie fragments. There are no records of the species or the required habitat along the Eastern Segment. Ground disturbance along the Western segment will be limited to laydown yards, stringing areas, and the installation of one new pole at the Steep Bank Lake Substation These construction areas avoid native prairies, and the Project is not anticipated to impact this species. The Applicants have determined the Project will have no effect on the species.

Rusty Patched Bumble Bee (*Bombus affinis*)

The rusty patched bumble bee is a federally-listed endangered species known to occur in Scott and Dakota counties.[75] Rusty patched bumble bees have been observed in a variety of habitats including prairies, woodlands, marshes, agricultural landscapes, parks and gardens. The species requires areas that provides nectar and pollen form a diverse array of flowers, undisturbed nesting sites in proximity to food source and overwintering sites for hibernating queens. A portion of the Eastern segment in Dakota County overlaps a USFWS Rusty Patched Bumble Bee High Potential Zone. The Applicants consulted with the USFWS and determined that, given the limited and temporary disturbance, the Project will have no effect to rusty patched bumble bees. The DNR recommends minimizing disturbance in this area and reseeding disturbed soils with native species.

Higgins Eye (Lampsilis higginsii)

Higgins eye (pearlymussel) is a federally-listed endangered freshwater mussel of larger rivers, including the Mississippi River. The species is typically found in areas with deep water and moderate currents.[76] The Applicants have determined that the Project will have no effect on this species.

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[73] DNR, Monarch Butterfly https://www.dnr.state.mn.us/insects/monarchbutterfly.html
[74] DNR, Rare Species Guide, Prairie Bush Clover, https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB27090; USFWS Website, Environmental Conservation Online System (ECOS). https://ecos.fws.gov/ecp/species/4458
[75] DNR, Rare Species Guide, Bombus affinis https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IIHYM24020
[76] USFWS, ECOS Higgins eye https://ecos.fws.gov/ecp/species/5428

Red Knot (Calidris canutus rufa)

The red knot is a federally-listed threatened species of shorebird typically found in coastal marine and estuarine habitats but may use inland saline lakes as stopover habitat in the Northern Great Plains. There is little information regarding red knots use of inland freshwater habitats during migration. The only saline lake in the region is Salt Lake, located approximately 30 miles north of the Project in Lac Qui Parle County on the South Dakota / Minnesota border The Applicants have determined that the Project will have no effect on the species.

Henslow's Sparrow (Centronyx henslowii)

Henslow's sparrow is a state-listed endangered species. Henslow's sparrow prefers large reclaimed old fields, undisturbed grasslands, and areas with tall vegetation and a substantial litter layer. They typically nest between mid-May and mid-July. Henslow's sparrow is known to occur in Lincoln, Lyon, and Scott counties[77] and has been documented along a portion of the Western Segment in Lincoln County. DNR recommends avoiding disturbance in suitable nesting habitat in these areas between May 15 and July 15.

Creek Heelsplitter (*Lasmigona compressa*)

The creek heelsplitter is a state-listed species of special concern that has been found in creeks along the Eastern Segment. The primary mitigation strategy is to implement effective erosion control techniques to minimize impacts to water quality.

Loggerhead Shrike (*Lanius ludovicianus*)

The Loggerhead shrike is a state-listed endangered species. Loggerhead shrike prefer large open prairie areas for hunting, and shrub thickets for nesting habitat. The loggerhead shrike's State threatened status was changed to endangered in 2013 by the DNR after survey results showed a significant decline in the number of shrikes being observed in the State. Large, open native prairie habitat in the State of Minnesota has declined significantly due to conversion to agricultural cropland. The species has been documented in the Project vicinity in Lincoln and Dakota counties. The DNR recommends avoiding tree and shrub removal in April through July in Lincoln and Dakota counties.

Blanding's Turtle *Emydoidea blandingii*)

Blanding's turtle (is listed as a Minnesota threatened species. The turtle needs both wetland and upland habitat to complete its life cycle. The species has been documented in the vicinity of the Project in Dakota and Scott counties. The Project has the potential to impact this rare turtle through direct fatalities and habitat disturbance/destruction due to excavation, fill, and other construction activities. DNR requires implementing a number of preventative measures in Dakota and Scott counties:

[77] DNR, Rare Species Guide, Centronyx henslowii
https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABPBXA0030

• Avoid wetland and aquatic impacts during hibernation (September 15 to April 15), if the area is suitable for hibernation,

• Implement erosion control blankets limited to bio-netting (no plastic, including hydro-mulch),
• Construction areas, especially aquatic or wetland areas, should be thoroughly checked for Blanding's turtles before the use of heavy equipment or any ground disturbance.

o Providing the Blanding's turtle flyer to all contractors working in the area.

o Monitoring for turtles during construction activitiesand report any sightings to the DNR Nongame Specialist.

• If turtles are in imminent danger, they must be moved by hand out of harm's way, otherwise, they are to be left undisturbed. DNR recommends that erosion control methods avoid use of plastic components [78]

Checking open trenches and removing trapped turtles before filling trenches can also minimize impacts to turtles.

Section IV.J.1 of the Original Brookings Permit (Appendix C) requires the Permittees to implement mitigation measures outlined in the fact sheet attached to the permit. These measures include making construction and maintenance personnel aware of the potential presence of the species, span rivers, stream, wetlands, and other suitable habitat where possible, and to coordinate with DNR and other agencies to minimize impacts to the species.

Minnesota Biological Survey Sites

There are five sites classified as "moderate" in the vicinity of the Western Segment. Moderate. sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes. Four of the sites are near (adjacent, across the road, or within 50 meters of the segment). The MBS site identified within the segment appears to be cultivated for hay or other crops since its designation. It appears that the Project will avoid these areas, which is the preferred mitigation strategy. However, if construction is performed in these areas, the DNR recommends implementing several BMPs including minimalizing vehicular disturbance, avoiding storing construction materials or spoils in MBS areas, employing erosion prevention and sediment controls, using weed-free mulches, and revegetating disturbed soils with native seeds.

Bald Eagles and Bald Eagle Nests

Bald eagles and bald eagle nests are protected by the federal Bald and Golden Eagle Protection Act which is administered and regulated by the USFWS. In Minnesota, the bald eagle nesting season is generally January through early July. Bald eagles are primarily found near rivers, lakes, and other

[78] DNR Comment, December 27, 2023, eDocket No. 202312-201580-01

waterbodies in remote and, more recently, within metropolitan areas. Nests are large, 6-8 feet across, and commonly found in tall trees. Human disturbance near nests may cause eagles to abandon their nests and young.

Bald eagles and nests can be directly impacted by transmission line construction activities if they are within or adjacent to the project alignment. Once operational, transmission lines pose an electrocution hazard to bald eagles while they are in flight. Young bald eagles and bald eagles actively engaged in hunting while near the transmission line are a greatest risk of striking the lines and being electrocuted. Young bald eagles have larger flight feathers to allow for greater stability and control while in flight, due to increased flight feather length the young bald eagles have larger wing span, which puts them at greater risk of contracting multiple lines at the same time if they fly into the transmission lines. Additionally, young bald eagles generally have less control and stability while they are learning to fly, which also puts them at greater risk of strike and electrocution should the young eagles get to close to the transmission lines. Bald eagles that are actively hunting or in pursuit of prey tend to focus exclusively on their prey item, which can lead to an increased potential for strike and electrocution as the hunting eagle may be less aware of nearby transmission lines.

The Applicants observed an active eagle nest approximately 225 feet of the Eastern Segment. The USFWS generally recommends a 660-foot buffer from existing nests to avoid potential impacts.[79] The Applicants indicate they are consulting with the USFWS and MDNR on how to avoid and minimize impacts to the nest. The Applicants state they will schedule construction in the area of the nest outside of the January to July nesting season and employ ornithological monitors prior to, during, and following construction to ensure the eagles return to the nest. The Applicants also state they will continue to work with the USFWS Migratory Bird Permit Office and MDNR will follow agency recommendations and conditions and will apply for applicable USFWS nest disturbance permits as needed.[80]

4.3.8 Climate Change and Design for Resilience

Climate change refers to any significant change in measures of climate lasting for an extended period. Greenhouse gases (GHG) are gaseous emissions that trap heat in the atmosphere and contribute to climate change. These emissions occur from natural processes and human activities. The most common GHGs emitted from human activities include carbon dioxide, methane, and nitrous oxide.

In 2020, the electricity sector was the second largest source of Minnesota GHG emissions at 15.8 million tons of 137 million tons, or 11.5%. GHG from electricity generation have decreased by about 60% in Minnesota since 2005 due to a shift in generation to lower- and non-emitting sources and an increase in end-use energy efficiency.[81]

[79] USFWS. *Do I Need an Eagle Take Permit.*(no date) https://www.fws.gov/story/do-i-need-eagle-take-permit#:~:text=When%20is%20a%20permit,permit%20may%20not%20be%20recommended.
[80] MA Application, at p. 58
[81] Minnesota Pollution Control Agency, Greenhouse gas emissions data,: https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory

Construction activities will result in short-term increases in GHG emissions from the combustion of fossil fuels in construction equipment and vehicles. Total GHG emissions for construction of the Project are estimated to be approximately 16,029 tons of carbon dioxide equivalent (CO_{2e}).[82] The project's construction emissions are an insignificant amount relative to Minnesota's overall emissions of approximately 137 million tons of CO_{2e} in 2020.[83]. Potential impacts due to construction GHG emissions are anticipated to be negligible.

Once operational, the Project will not increase GHG emissions beyond what that that already results from periodic maintenance activities related to vegetation management, and necessary repairs of the Original Brookings Line. The Applicants anticipate using sulfur hexafluoride (SF_6) in the breakers installed at the substations. Small releases of SF_6 will occur as part of regular breaker operation and maintenance.[84] SF_6 is a GHG with significantly higher greenhouse warming potential than CO_2. Potential impacts due to operational GHG emissions are anticipated to be negligible. Operation of the Project will not substantially increase GHG beyond those created through maintenance of the Original Brookings Line.

To the extent that the Project minimizes transmission congestion, the Project would be beneficial to GHG emissions by reducing constraints for operation and, to a lesser degree, development of solar and wind generation.

A warming climate is expected to cause increased flooding, storms, heat wave events, an increased potential for long dry spells, and warmer, wetter winters. These events, especially an increased number and intensity of storms, could increase risks to the project, e.g., high winds and an increase in ice loading on conductors could result in downed transmission lines.

The Applicants designed the Original Brookings Line to meet or exceed the National Electrical Safety Code (NESC). For example, the Original Brookings Line design provides for clearances that exceed NESC standards by up to five feet, which allows for increases in conductor sag due to heat or ice formation. The Applicants will use twisted pair conductors to minimize the potential for galloping (when conductors move or vibrate) that can occur in windy conditions, especially when there is ice on the conductors. Galloping can cause outages if the conductors connect with other phases or with the ground. The Applicants also note the potential for increased noxious weeds that can be addressed through ongoing and adaptive vegetation. The design allows for the continuance of safe operations through storm events and long-term changes in weather patterns.

[82] Xcel Energy, *GHG Supplement to Minor Alteration Application*, February 13, 2024, eDocket No. 20242-203360-01
[83] MPCA, *Minnesota GHG Emissions 2005 – 2020.*
https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory
[84] Response to Data Request 1, Appendix B

5 Project Alternatives – Human and Environmental Impacts

Minnesota Rule 7849.1200 required the ER to contain information on alternatives to the proposed project and t address mitigating measures for anticipated adverse impacts. In addition to evaluating alternatives and their impacts, a no build option must also be evaluated. This section provides a discussion of alternative power sources to the Project.

5.1 No-Build Alternative

Under the No-build Alternative, the Applicants would continue to operate and maintain the Original Brookings Line as it is currently. The Original Brookings Line was constructed in phases and was fully energized in 2015. Under this scenario, the 141.5-mile segment between the Lyon County Substation and Helena Substation would continue to operate as a double-circuit transmission line, while the Western Segment between the Brookings County Substation and the Lyon County Substation (48.9 miles in Minnesota, 59.5 miles in total) and the Eastern Segment between the Helena and Hampton substations (39 miles) would continue to operate as single circuits on double-circuit capable structures.

5.1.1 Impacts to Natural Resources

Because the no-build alternative will not change the status quo, it will not result in any direct impacts to natural resources (geology, soils, vegetation, wildlife, water resources and wetlands, or rare or unique natural resources).

To the extent that the no-build alternative hinders the ability to bring wind and solar generation online and continues curtailment of wind resources, there may be additional impacts to air quality and increased greenhouse gasses if natural gas or other fossil fuels are used to meet energy demand.

5.1.2 Impacts to Human Settlement

Because the no-build alternative will not change the status quo, it will not result in additional impacts to human settlement (noise, aesthetics, archaeological or historical resources, cultural resources, zoning and land use compatibility, transportation and public services including communications, public health and safety, or environmental justice).

This alternative also will not improve the deliverability of wind generation, reduce curtailments of wind energy, or improve the regional transmission system. The Applicants contend that the Project will improve the transmission system's ability to respond to unplanned system outages and enable access to a diverse mix of generation resources.

The no-build alternative will not do anything to remove existing transmission constraints. The existing constraints have hampered the ability to diversify generation through the addition of new wind and solar facilities. The constraints have also resulted in curtailment of wind generation at some wind farms. Some local governments have recently experienced declines in production tax revenues due to curtailments resulting from congestion on the electric grid. }

5.2 New Generation or Upgrades to Existing Generation Facilities

Minnesota Rule 7849 requires the Commission to consider generation alternatives to a transmission project.

Wind and solar generating projects are by far the most common electric power generating facilities constructed in Minnesota within the past 15 years. These wind and solar facilities are predominantly located in southern Minnesota, due to the quality of the wind and solar resources and the relatively large sites required for these generation facilities.

Alternatively, a generation alternative could be one or more natural gas generating plants using combustion turbines or combined cycle turbines. Gas generating plants are located throughout Minnesota.

The following discussion speaks generally about generation alternatives and is not specific as to the size or location of generation alternatives.

5.2.1 Impacts to Human Settlement

All human settlement impacts from generating facilities are dependent to some degree on the location of the generation alternative. This is particularly true with respect to cultural resources, zoning and land use., and environmental justice Although the potential for displacement is also location-specific, electric power generation facilities permitted by the Commission have not typically resulted in displacement of homes or businesses.

In general, the economic benefits of electric generation projects accrue more to local economies than those from transmission projects. Utility-scale generation projects would be expected to have a larger construction workforce than required for the Project. Those short-term benefits would accrue to the local economies through lodging and expenditures at local businesses. All generation alternatives would pay property taxes. Wind and solar generating facilities also pay an energy production tax payment of $1.20 per MWh of electricity produced. All generating alternatives would also require employees to operate the facility, although the number of operating employees would be a small fraction of the construction workforce.

All generation alternatives will generate dust and air emissions during construction. All generation alternatives will create traffic impacts that require coordination with local road authorities to minimize impacts.

Major differences between the generation alternatives are discussed below.

5.2.1.1 Wind Generating Facility

Wind farms would alter the current landscape through the introduction of large wind turbines, as well as ancillary facilities such as substations, operations and maintenance facilities, access roads and security fencing. Depending upon the location of the facility, additional transmission may be needed to connect the generation to the electric grid. While the footprint of the turbines is relatively small (approximately 1-2 acres/MW), wind farms require large land areas (thousands of acres) for siting and installation of

infrastructure where developers have obtained wind rights. Most farming activities can continue in the presence of wind turbines.

Due to turbine height (larger recent turbines have a total height of approximately 450 – 550 feet from ground to fully extended turbine tip), wind farms are visible from greater distances, potentially impacting recreationalists at greater distances. Mitigation of impacts to aesthetic and visual resources is best accomplished through micrositing of wind turbines and maintaining designated setbacks from participating and non-participating landowners. In general, siting wind projects in rural areas minimizes human impacts. Aesthetic impacts to public lands can be mitigated by siting wind projects outside of these areas, and utilizing natural features such as topography and vegetation to reduce visual intrusions.

Turbines produce audible noise while operating. 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. Turbines must meet PCA noise standards. Turbine noise can be mitigated by increasing the distance between turbines and homes, blade design (including serrations) to reduce aerodynamic noise, and operating adjustments.

Due to turbine height, wind farms may present a hazard for aviation. Potential impacts are mitigated by siting wind farms away from airports. Additionally, proposed turbine locations must be reviewed by the FAA, and appropriately lighted per FAA requirements. Additionally, a permittee is required to notify local airports prior to construction.

Wind farms are predominantly located in southern Minnesota, due to the quality of the wind resource and the relatively large sites required for development.[85] Given the presumed location of a new or expanded wind farm, a wind alternative would not address the purpose of the Project to reduce congestion on the transmission system and may contribute congestion and curtailment.

5.2.1.2 Solar Facility

The installation of a solar farm will result in visible landscape changes and given that the footprint is larger than that for wind farm (approximately seven to 10 acres per MW) more land surface would be converted in a solar farm application. However, due to their relatively low profile, photovoltaic solar facilities will not be visible from great distance and the aesthetic impacts will be experienced primarily by nearby residents. A new solar farm would also likely require ancillary facilities such as substations, operations and maintenance facilities, access roads and security fencing. Depending upon the location of the facility, additional transmission may be needed to connect the generation to the electric grid. The primary strategy for minimizing aesthetic impacts associated with solar farm development is choosing a site where the solar facilities are compatible with the existing landscape, separated as far as possible from existing homes or shielded from view by terrain or existing vegetation. Landscaping plans can be

[85] Commerce, Map of State Permitted Wind Facilities, December 2022, https://apps.commerce.state.mn.us/eera/web/project-file/12139

developed to identify site-specific landscaping techniques including vegetation screening, berms or fencing to minimize visual impacts to adjacent land uses.

Solar farms would remove land from agricultural production. Solar farms do not typically impact forestry or mining operations.

As with wind, solar facilities are predominantly located in southern Minnesota, due to the quality of the resource and the relatively large sites required.[86] Given the presumed location of a new or expanded solar facility, a solar generating alternative would not address the purpose of the Project to reduce congestion on the transmission system and may contribute to congestion and curtailment.

5.2.1.3 Natural Gas Generating Plant

Based on recent Commission-proceedings for natural gas plants, such as the 215 MW addition to Xcel Energy's Black Dog Generating Plant (Docket E002/GS-15-834) and GRE's Cambridge Unit 2 Combustion Turbine (Docket ET-2/GS-22-122), a gas fired combustion turbine system requires approximately 0.1 – 0.2 acres per MW to accommodate generator sets, fuel storage tanks, electrical switch gear, an operating and maintenance building, cooling water storage, a natural gas pipeline terminal, and associated facility infrastructure.[87]

To reduce noise impacts, the plant could employ noise mitigation measures such as, insulated buildings, barriers, or sound baffles to ensure compliance with the Minnesota Pollution Control Agency rules limiting noise levels at nearby noise receptors. These measures are generally available.

In addition to the health and social impacts from criteria pollutants and GHG emissions, a gas generating plant would also be accompanied by risks related to fuel or hazardous material spills from pipeline breaks, backup fuel storage, and hazardous materials associated with ongoing operations and maintenance. These risks can be mitigated by standard BMPs, and leaks and spills are rare.

5.2.2 Impacts to the Natural Resources

A generation facility in Minnesota may have different ecological and environmental features (setting) compared to the Project

All generation alternatives would have short-term and localized air quality impacts from vehicle exhaust and dust related to construction activities; as these alternatives are anticipated to have a larger disturbance area and a longer construction timeline, these temporary impacts would be expected to be greater than those for construction of the Project.

[86] Commerce, Map of State Permitted Solar Facilities, December 2022, https://apps.commerce.state.mn.us/eera/web/project-file/12140

[87] The generating capacity at the Black Dog Generating Facility is 498 MW on a developed area of 80 acres, the combined generating capacity of both units at the Cambridge Station is 219 MW on a 23-acre site.

As with the Project, greenhouse gas emissions related to construction of a generation alternative will be largely related to vehicle emissions. Although emissions from construction of a generation alternative would temporary and minimal in comparison to Minnesota's overall GHG emissions, emissions would be greater than that for the Project, as construction of a generation alternative would occur over a longer window and impact a greater area than that required for the Project.

The primary source of impacts to surface water from any generation alternative would be erosion and runoff during construction. The potential for indirect impacts to surface waters is affected by the generation facility's design and proximity to surface water features. Likewise, generating facilities do not typically have a direct impact to wetlands, but indirect impacts could occur as a result of erosion and runoff during construction. Mitigation strategies would be similar to those of the Project; any generation alternative would require a NPDES permit and the SWPPP would provide detailed mitigation strategies and identify BMPs to prevent or reduce impacts to impaired water bodies.

5.2.2.1 Wind Generating Facility

Wind farms would not emit criteria pollutants during operation. Compared to the Project, operations and maintenance activities would be expected to be more frequent (at least several times per week), generating minimal criteria pollutants. It is anticipated that greenhouse gas emissions related to operation and maintenance activities would decline over time as both the usage of vehicles declines following the more intense construction phase, and as the national vehicle fleet shifts away from internal combustion engines and towards electric vehicles over the 30-year operating life of the Project.

Impacts to vegetation and wildlife, including rare and unique natural resources, would depend to a large extent on the location of the facility. Because a new wind farm would impact a larger land area than the Project, a wind farm would be expected to have greater impacts to vegetation.

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.

Given the rural location of wind farms, private well and septic systems would be anticipated to provide domestic water and sewer services. Installation of the onsite services would require a well permit from the MDH and an Individual Sewage Treatment System permit from the County.

5.2.2.2 Solar Facility

As with a wind farm, a solar generating facility would not emit criteria pollutants during operation of the generating facilities. Compared to the Project, operations and maintenance activities would be expected to be more frequent (at least several times per week), generating minimal criteria pollutants. As with the Project, greenhouse gas emissions related to construction of a a solar farm will be largely related to vehicle emissions.

Vegetation impacts from solar farm development depend upon site-specific characteristics; it is difficult to assess the degree and ecological significance of vegetative impacts for a solar farm without knowledge of the land cover types, topography, and general environmental setting of a hypothetical project site. During the site preparation phase for utility-scale solar facilities, developers often grade land (cut and fill) and remove all vegetation to minimize installation and operational costs, prevent plants (including crops) from shading panels, and minimize potential fire or wildlife risks. Because of the large footprint of solar facilities, approximately seven to 10 acres perm MW, the scale of vegetation impacts would be larger than the Project. Solar farms permitted by the Commission are required to develop a Vegetation Management Plan in consultation with resources agencies, and to implement that plan throughout the facility's operating life.

Given the rural location of most solar farms, private well and septic systems would be anticipated to provide domestic water and sewer services. Installation of the onsite services would require similar regulatory review and permitting as for a wind farm.

5.2.2.3 Natural Gas Generator

Combustion turbine generators emit significant quantities of regulated air pollutants and GHG throughout its operating life. A combustion turbine generator would require an air permit from the MPCA. The air permit would specify measures (e.g., equipment specifications or constraints on the time the facility may operate) to mitigate criteria pollutants. There are two methods to mitigate air pollution impacts from a generation alternative. However, even with these measures in place, a natural gas plant would emit significantly more criteria pollutants than the Project or renewable generating alternatives such as wind or solar.

Combustion turbines will also generate more wastewater than wind or solar farms, due to the need for wastewater in the cooling process in addition to the sanitary needs for employees during operation. Depending upon the location of the facility and the volume of wastewater, wastewater may be recycled through a closed loop process, or may be discharged to onsite retention ponds or through municipal sewers.

5.3 Transmission Alternatives of a Different Voltage or Configuration or Different Endpoints

Minnesota Rule 7849.0260 requires the ER to describe and analyze the impacts, mitigation measures and feasibility of generating electricity as an alternative to the Project. Accordingly, this section discusses impacts and potential mitigation measures for:

- Construction of only one segment of the Project,
- Transmission of a Different Voltage (includes different voltages, different conductors, direct current (DC), underground transmission), and
- Transmission with Different Endpoints

The following discussion provides a general comparison of these transmission alternatives to the Project

5.3.1 Impacts to Human Settlement

Impacts related to transmission alternatives are typically very location specific. This is particularly true with respect to cultural resources, zoning and land use., and environmental justice Although the potential for displacement is also location-specific, electric power generation facilities permitted by the Commission have not typically resulted in displacement of homes or businesses.

Construction of only one segment of the Project would limit human settlement impacts to only the segment being constructed. As discussed in Section 4.1, human settlement impacts from the Project are nominal.

Use of different conductors on the existing structures would be expected to have the same impacts as the Project.

Any above-ground transmission alternative of a different voltage would require new structures with new ROW. Although impacts would depend upon the location, aesthetic and temporary traffic impacts would be greater than for the Project. The actual impacts would be location-specific, and mitigation measures would be similar to those used for the Project and the Original Brookings Line.

Undergrounding is used rarely in the United States in areas where there above-ground structures present a safety issue (e.g., near airports) or congested downtown centers where there is no space available between city streets and adjacent buildings for adequate clearance. The construction activities for an overhead transmission line, are typically concentrated around the line's structures, with the areas between structures left relatively undisturbed except for the removal of trees that could interfere with the energized conductors. A narrow pathway between structures is often all that is necessary to string the conductors. With underground construction, however, the entire right-of-way must be cleared for construction activities along the entire length of the corridor.

While overhead lines are subject to more frequent outages then underground cables, service is usually quickly restored by the automatic re-closing of circuit breakers. The lower incidence of outages with underground cables is offset by the fact that the outages are much longer.

5.3.2 Impacts to the Natural Resources

Construction of only one segment of the Project would limit human settlement impacts to only the segment being constructed. As discussed in Section 4.3, natural resource impacts from the Project are nominal.

The use of different conductors on the existing facilities would be expected to have the same impacts to natural resources

The new structures required for any above-ground transmission alternative (different voltage or different end points) would require greater vegetative clearing and more soil disturbance than the Project. Wetland impacts would depend upon the location of the alternative but given the relatively minor wetland impacts from the Project, it is likely that wetland impacts from any transmission alterative would be greater. Mitigation measures to minimize impacts to vegetation, wildlife, soils,

water resources, and wetlands would be similar to those employed by the Project and the Original Brookings Line.

An underground transmission alternative would create far greater impacts to vegetation and soils than the Project. Mitigation measures would be tailored to the Project; Minnesota does not have a depth of experience with lengthy underground transmission lines.

6 Availability and Feasibility of Alternatives

Having analyzed comparative impacts of alternatives, an Environmental Report is required to offer an assessment of the availability and feasibility of those alternatives (Minn. Rule 7849.1500 subp. 1F). This section describes the feasibility and availability of alternatives to the Brookings 2nd Circuit Project.

6.1 Brookings 2nd Circuit Project

The Brookings 2nd Circuit Project is feasible and available to be implemented once applicable permits are received.

6.2 No-build Alternative

The no-build alternative is feasible and available. However, the no- no-build alternative will not alleviate existing transmission constraints that have hampered the ability to add renewable generation sources and curtailed some existing wind generation

6.3 Generation Alternative

In general terms, the generation alternative is feasible. Both renewable generation facilities, in the form of wind and solar, and combustion turbines are widely available in Minnesota. However, any type of generation alternative would have greater environmental impacts than the Project, would have a higher cost and longer timeframe, and would not address the congestion for which the Project is proposed.
Transmission Alternative

6.4 Transmission Alternative

The various transmission alternatives are feasible, they could be built. The partial double circuit (adding a second circuit to either the Western Segment or Eastern Segment is available in the short term. Other transmission alternatives (higher voltage, underground, double circuit, different endpoints) would be available, although at a higher cost and in a longer time-frame than the Project.

Undergrounding high-voltage transmission lines is generally not considered feasible for cost and reliability reasons. Undergrounding of electric utility infrastructure is a technically feasible option, and it is common today to see lower-voltage distribution lines that connect to homes and businesses buried directly in the ground using less invasive construction methods. In the case of distribution lines, undergrounding offers aesthetic and environmental benefits while posing relatively few construction, maintenance, and operations challenges. However, the complexity, and cost, of undergrounding increases as the voltage increases. As a result, undergrounding is seldom used for transmission facilities of the size of the Project.

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