APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A ROUTE PERMIT FOR THE MINNESOTA ENERGY CONNECTION PROJECT

MPUC Docket No. E002/TL-22-132

October 2023

Submitted by
Northern States Power Company

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYM LIST

AADT	Annual Average Daily Traffic
AFUDC	Allowance of Funds Used During Construction
AIMP	Agricultural Impact Mitigation Plan
AMA	Aquatic Management Area
Applicant	Northern States Power Company, dba Xcel Energy
Application	Route Permit Application
APLIC	Avian Power Line Interaction Committee
ARMER	Allied Radio Matrix for Emergency Response
ASIS	Aggregate Source Information Map
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BWSR	Board of Soil and Water Resources
CAA	Clean Air Act
CFR	Code of Federal Regulations
CH_4	methane
Chlorpyrif	chlorpyrifos
CL-	chloride
CN	Certificate of Need
CO	carbon monoxide
CO2	carbon dioxide
CO2e	carbon dioxide equivalent
Commission	Minnesota Public Utilities Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CVTs	continuously variable transmissions
CWA	Clean Water Act
CWI	County Well Index
dB	decibels
dBA	A-weighted decibels
DO	dissolved oxygen
DOI	U.S. Department of the Interior
Dkeys	Determination Keys
DWSMA	Drinking Water Supply Management Area

E. coli	*Escherichia coli*
ECS	Ecological Classification System
EERA	Minnesota Department of Commerce, Energy and Environmental Review and Analysis
EIS	environmental impact statement
ELF	extremely low frequencies
EMF	electric and magnetic fields
END	endangered
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EXPN	experimental non-essential population
FAA	Federal Aviation Administration
FC	fecal coliform
FEMA	Federal Emergency Management Administration
FERC	Federal Energy Regulatory Commission
FishesBio	fishes bioassessment
FM/AM	Frequency Modulation/Amplitude Modulation
FR	Federal Register
GHG	greenhouse gas
GIS	Geographic Information System
GPS	Global Positioning System
GWP	global warming potential
Hg-F	mercury in fish tissue
HUC	Hydrologic Unit Code
Hz	hertz
IBA	Important Bird Area
InvertBio	aquatic macroinvertebrate bioassessments
IPaC	Information for Planning and Conservation
IRP	Integrated Resource Plan
ISD	Independent School District
kV	kilovolt
kV/m	kilovolts per meter
LGU(s)	local government unit(s)
MBTA	Migratory Bird Treaty Act

MBS	Minnesota Biological Survey
MCE	Minnesota Conservation Explorer
MDH	Minnesota Department of Health
mG	milliGauss
MHz	megahertz
MISO	Midcontinent Independent System Operator, Inc.
MNDNR	Minnesota Department of Natural Resources
MNDOA	Minnesota Department of Agriculture
MNDOT	Minnesota Department of Transportation
MNEC or Project	Minnesota Energy Connection Project
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MVAR	megavolt amp of reactive power
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAC	noise area classifications
NAS	National Audubon Society
NCED	National Conservation Easement Database
NESC	National Electric Safety Code
NHIS	Natural Heritage Information System
NLCD	National Land Cover Database
NLEB	northern long-eared bat
NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
NPC	Native Plant Community
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
Nutrients	nutrients / eutrophication
NWI	National Wetlands Inventory
O_3	ozone
ORVW	Outstanding Resource Value Waters
OSA	Office of the State Archaeologist

Pb	lead
PCB-F	PCB in fish tissue
PCN	Pre-Construction Notification
PE	proposed endangered
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub-shrub
PM	particulate matter
Project Study Area	The following Minnesota counties through which the route options presented in this Application traverse: Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon Counties. Refer to Figure 1.0-1.
PWI	Public Waters Inventory
RGP	Regional General Permit
RIM	Reinvest in Minnesota
Routing Study Area	The area between the two Project endpoints that includes all or portions of Sherburne, Stearns, Wright, Swift, Kandiyohi, Meeker, McLeod, Carver, Lac qui Parle, Chippewa, Renville, Sibley, Yellow Medicine, Redwood, Brown, Nicollet, Lincoln, Lyon, Murray, and Cottonwood counties. Refer to Figure 3.1-1.
SC	special concern
SDWA	Safe Drinking Water Act
SF_6	sulfur hexafluoride
Sherco Substation	Sherburne County Generation Station Substation
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SO_2	sulfur dioxide
SOBS	Sites of Biodiversity Significance
SSA	sole source aquifer
SSURGO	U.S. Department of Agriculture – Natural Resources Conservation Service's Soil Survey Geographic Database
STATCOM	static synchronous compensator
SWPPP	Stormwater Pollution Prevention Plan
T	turbidity

The NSP Companies	Northern States Power Company, a Minnesota corporation and Northern States Power Company, a Wisconsin corporation
THPO	Tribal Historic Preservation Officer
THR	threatened
TMDL	total maximum daily load
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMP	Vegetation Management Plan
VOC	volatile organic compounds
WAN	Wildlife Action Network
WHO	World Health Organization
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area
WNS	white-nose syndrome
Working Group	Minnesota Interagency Working Group
WOTUS	jurisdictional waters of the U.S.
WPA	Waterfowl Production Area
Xcel Energy	Northern States Power Company, a Minnesota corporation, dba Xcel Energy

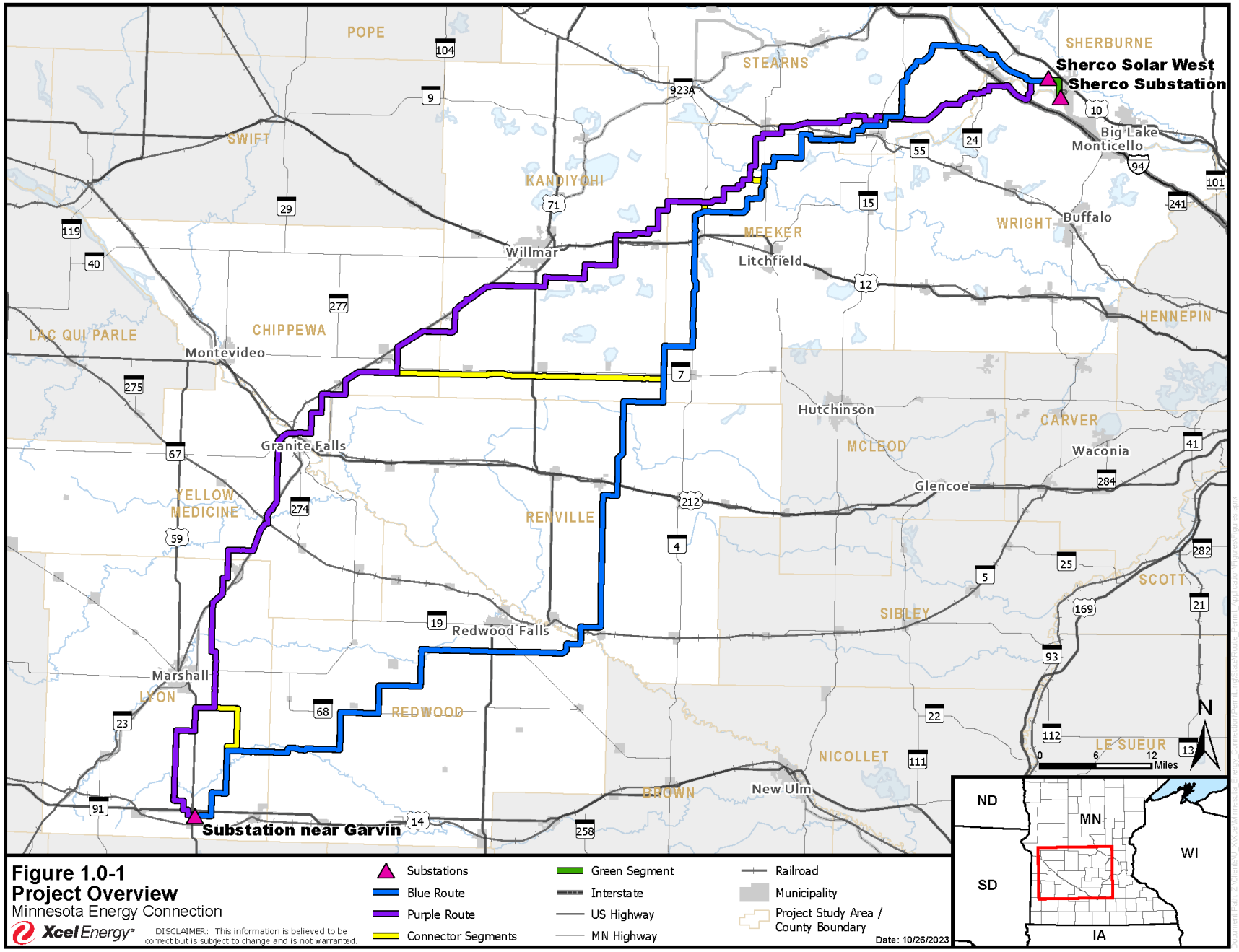
1.0 INTRODUCTION

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (the Applicant or Xcel Energy) is applying for a Route Permit from the Minnesota Public Utilities Commission (MPUC or Commission) for approval to construct the Minnesota Energy Connection Project (MNEC or Project) in Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon counties in Minnesota (i.e., the Project Study Area). The Project will provide a 345 kilovolt (kV) connection between the existing Sherburne County Generation Station Substation (Sherco Substation) in Becker, Minnesota, and a new substation proposed to be constructed near the Town of Garvin in Lyon County, Minnesota. The Project components include:

- A new 3.1-mile single circuit 345 kV line between the existing Sherco Substation and the existing Sherco Solar West Substation, referred to as the "Green Segment", to be co-located as a double circuit line with the existing 345 kV line[1] between these two substations;
- A double-circuit 345 kV transmission line connecting Xcel Energy's existing Sherco Solar West Substation in Becker, Minnesota, to a new substation near Garvin. The routes proposed in this Route Permit Application (Application) are approximately 171 and 174 miles long and are referred to as the "Purple Route" and "Blue Route," respectively. Each route option would be combined with the Green Segment for a total end-to-end Purple/Green or Blue/Green route;
- Modifications to the existing Sherco Substation and Sherco Solar West Substation to accommodate the new 345 kV transmission lines;
- A Voltage Support Substation that will be located approximately 80 miles along the transmission line south of the Sherco Substation in Meeker, Kandiyohi, or Renville County, depending on the final route selected;
- An Intermediate Substation that will be located approximately 20 miles north of the new substation proposed near Garvin in Lyon or Redwood County, depending on the final route selected; and
- A new substation as the terminal point of the Project near Garvin in Lyon County referred to in this Application as the Terminal Substation.

Figure 1.0-1 provides an overview of the Project components listed above.

[1] The existing 345 kV line is Xcel Energy's Line 5651 and was constructed as a double circuit capable line. The Project will occupy the open position on existing structures.


POPE
SHERBURNE
Sherco Solar West
Sherco Substation
STEARNS
SWIFT
KANDIYOHI
Big Lake
Monticello
Buffalo
WRIGHT
MEEKER
Willmar
Litchfield
LAC QUI PARLE
CHIPPEWA
Montevideo
HENNEPIN
Hutchinson
CARVER
MCLEOD
Waconia
Granite Falls
Glencoe
YELLOW MEDICINE
RENVILLE
SCOTT
SIBLEY
Redwood Falls
Marshall
LYON
REDWOOD
NICOLLET
LE SUEUR
BROWN
New Ulm
Substation near Garvin
0 6 12 Miles
N
ND
MN
SD
WI
IA
Figure 1.0-1
Project Overview
Minnesota Energy Connection
Xcel Energy®
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Blue Route
Purple Route
Connector Segments
Green Segment
Interstate
US Highway
MN Highway
Railroad
Municipality
Project Study Area / County Boundary
Date: 10/26/2023

In its 2020-2034 Upper Midwest Integrated Resource Plan (IRP) filing (MPUC Docket No. E002/RP-19-368), Xcel Energy proposed to construct two 345 kV transmission lines (gen-ties) between Lyon County and the existing Sherco Substation to acquire needed renewable energy resources and also to reuse Xcel Energy's existing and valuable interconnection rights at the Sherco Substation resulting from the retirement of the three Sherco coal-fired generators. Xcel Energy proposed two 345 kV gen-tie lines that would deliver 1,996 megawatts (MW) of carbon-free energy generation to the Sherco Substation. The Project will also enable the interconnection of more than 4,000 MW of carbon-free energy generation overall that will support the recently enacted "100 percent by 2040" law that, generally, sets a standard for public utilities to generate or acquire 100 percent of the energy for retail sales from carbon-free resources.

The Commission approved Xcel Energy's IRP in April 2022.[2] The Commission ordered Xcel Energy to begin proceedings to obtain a Certificate of Need (CN) and Route Permit for the proposed Project in this Application. The Project is one part of an overall resource acquisition plan. The generators that will connect to the Project will be identified through a future request for proposals process and will be subject to separate regulatory approvals. The Project enables Xcel Energy to reuse its valuable and existing transmission interconnection rights (approximately 2,000 MW total). These rights will be retained pursuant to the Federal Energy Regulatory Commission (FERC) Electric Tariff, Midcontinent Independent System Operator, Inc. (MISO) Attachment X. The FERC has granted current generation owners the right to reuse the associated transmission interconnection for new generation at those sites as the old generation retires as part of the energy transition from carbon-based fuels to renewable energy.

Xcel Energy submitted a CN Application in March 2023 and now submits this Route Permit Application for the Project. The two routes presented in this Application are those the Applicant identified through a comprehensive review and analysis of engineering options, environmental conditions, and socioeconomic considerations, with an objective to minimize impacts on the environment and affected landowners while meeting the Project's need. Beginning in 2022 and extending through mid-2023, the Applicant conducted a thorough and systematic route selection process that included consideration of statutory and rule requirements, information gathering, public outreach and input (including multiple rounds of public open houses), and comparison of route segments and alignments. Considerable public and agency outreach and information gathering was conducted in the Project Study Area. The Applicant also met with state and local agencies as part of the outreach program for the Project. The Applicant developed a Geographic Information System (GIS) database that contained

[2] *In the Matter of the 2020-2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel Energy*, MPUC Docket No. E-002/RP-19-368, Order Approving Plan with Modifications and Establishing Requirements for Future Filings, at Ordering ¶ 2.A.6 (Apr. 15, 2022)

information gathered from publicly available data resources and from on-site field review efforts that was used to compare the merits of various routing options with a goal of developing Application routes that minimize impacts to sensitive resources to the extent practicable.

1.1 PROJECT OWNERSHIP

Xcel Energy will own all facilities proposed in this Application. Xcel Energy will be responsible for the construction, maintenance, and operation of the proposed 345 kV double circuit transmission line and all associated facilities proposed in this Application.

Northern States Power Company, doing business as Xcel Energy, is a Minnesota corporation headquartered in Minneapolis, Minnesota, that is engaged in the business of generating, transmitting, distributing, and selling electric power and energy and related services in the states of Minnesota, North Dakota, and South Dakota. In Minnesota, Xcel Energy provides electric service to 1.3 million customers. Xcel Energy is a wholly owned utility operating company subsidiary of Xcel Energy Inc. and operates its transmission and generation system as a single integrated system with its sister company, Northern States Power Company, a Wisconsin corporation, together known as the NSP Companies. The NSP Companies are vertically integrated transmission-owning members of MISO. The NSP Companies are among the largest transmission-owning members of MISO with more than 8,500 miles of transmission lines and approximately 550 transmission and distribution substations.

1.2 PERMITTEE

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy is the permittee for the Project. Contact information is provided below.

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1.3 CERTIFICATE OF NEED PROCESS

Minnesota Statutes section 216B.243 dictates that a CN is required for a "large energy facility" as defined in Minnesota Statutes section 216B.2421. A large energy facility includes "any high-voltage transmission line with a capacity of 200 kVs or more and greater than 1,500 feet in length" and "any high-voltage transmission line with a capacity of 100 kVs or more with more than ten miles of its length in Minnesota or that crosses a state line."[3] The Applicant filed an application for a CN to construct the Project in March 2023 under Docket No. E002 /CN-22-131. On May 2, 2023, the Commission issued an Order accepting Xcel Energy's CN application as complete.[4] Xcel Energy filed a revised CN application on May 18, 2023.[5]

1.4 JOINT PROCEEDING WITH CERTIFICATE OF NEED

Minnesota Statutes section 216B.243, subdivision 4 and Minnesota Rule 7849.1900, subpart 4 permit the Commission to hold joint proceedings for the CN and Route Permit in circumstances where a joint hearing is feasible, more efficient, and may further the public interest.

On August 10, 2023, the Commission issued an order directing joint proceedings to be held on the CN and Route Permit applications.[6] Accordingly, Xcel Energy anticipates that this Application will be processed jointly with the CN. The route permitting process is described further in Section 1.5 below.

1.5 ROUTE PERMITTING PROCESS

This Application is submitted under the full permitting process set forth by Minnesota law, specifically, Minnesota Statute § 216E.03 and Minnesota Rules 7850.1700 to 7850.2700 and 7850.4000 to 7850.4400. The applicable statutes and rules require, in addition to other information, that an applicant provide at least two proposed routes in its Route Permit application. No route can be designated as a preferred route and all proposed routes must be designated as alternatives.[7] A "route" is defined in Minnesota

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3 Minn. Stat. § 216B.2421, subds. 2(2) and 2(3).

4 Order (May 2, 2023). E-docket ID No. 20235-195506-01, Available online at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={4037DD87-0000-C411-8047-49BE7CF40470}&documentTitle=20235-195506-01.

5 Other – Revised Certificate of Need – MN Energy Connection Project - Application (May 18, 2023). E-docket ID No. 20235-195956-02. Available online at https://www.edockets.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={505E3088-0000-CE30-A6F9-4D388E9707FE}&documentTitle=20235-195956-02.

6 Order – Authorizing Joint Proceedings (August 10, 2023). E-docket ID No. 20238-198151-01, Available online at https://efiling.web.commerce.state.mn.us/edockets/searchDocuments.do?method=showPoup&documentId={104AE089-0000-C816-959D-CA6A611D6E9D}&documentTitle=20238-198151-01.

7 Minn. Stat. § 216E.03, subd. 3; Minn. R. 7850.1900, Subp. 2(C).

statutes as "the location of a high voltage transmission line between two end points. The route may have a variable width of up to 1.25 miles."[8] A Route Permit Completeness Checklist is provided in Appendix A and a copy of the Applicant's 90-day pre-application letter is provided in Appendix B.

In this Route Permit proceeding, Commission staff, Minnesota Department of Commerce, Energy and Environmental Review and Analysis (EERA) staff, and an administrative law judge will oversee evaluation and review of the proposed routes and the gathering of input from agencies, local units of government (LGUs), and the public.

Once the Commission finds the Application complete, notice of an environmental impact statement (EIS) scoping meeting will be provided to landowners, other stakeholders in the Project area and those on the Project Contact List. Interested parties may sign up for the Project Contact List by contacting the Commission at docketing.puc@state.mn.us or 651.201.2204 (1.800.657.3782).

During the scoping process, EERA will gather information on potential impacts and mitigation measures that should be evaluated in the EIS. Based on public input, EERA will recommend impacts and mitigation measures, including alternatives, that it believes should be evaluated in the EIS. A Scoping Decision will then be issued that identifies the issues that will be evaluated in the EIS. EERA will issue a Draft EIS, and meetings will be held in the Project area to gather comments on the content of the Draft EIS. After these meetings, EERA will issue a Final EIS.

In addition to a Draft and Final EIS, public hearings on the Project will be held. The public will be invited to make comments on the Project at these hearings before an administrative law judge. After the hearings, the administrative law judge will provide a period during which stakeholders can submit written comments on the Project. Additionally, the administrative law judge will receive briefs from the Applicant and other parties to the proceeding. The administrative law judge will review this Application, the EIS, briefs, and comments received during the public hearings and, following the comment period, will prepare findings of fact, conclusions of law, and recommendations for the Commission. During an open meeting, the Commission will deliberate and make a decision as to the route for the Project, using the criteria set forth in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100 to guide its decision. Because the Commission will consider the route permit jointly with the CN, the Commission will also first make a determination on the CN at this open meeting.

[8] Minn. Stat. § 216E.01, subd. 8; *see also* Minn. R. 7850.1000, Subp. 16.

2.0 PROJECT INFORMATION

This section describes proposed project components, route alternatives, and route width. The section also describes transmission structure and conductor design, and right-of-way required for the project. The anticipated schedule and estimated costs are included in this section, as well.

2.1 PROJECT PROPOSAL

The Applicant proposes to construct the Project components listed below.

- Green Segment: Adding a second circuit to the existing single circuit 345 kV gen-tie (Line 5651) that connects the existing Sherco Substation to the existing Sherco Solar West Substation. The Green Segment is approximately 3.1 miles long, and no additional right-of-way will be needed.
- Purple or Blue Route: A new double circuit 345 kV transmission line from Xcel Energy's existing Sherco Solar West Substation located just outside of Becker in Sherburne County, to a new substation near the Town of Garvin in Lyon County.
- Existing Substation Modifications: Modifications to the existing Sherco Substation and Sherco Solar West Substation to accommodate the new 345 kV transmission lines.
- Voltage Support Substation: A new substation approximately 80 miles along the Purple or Blue Routes south of the Sherco Solar West Substation.
- Intermediate Substation: A new substation approximately 20 miles north of the Terminal Substation.
- Terminal Substation: A new substation as the terminus of the Project in Lyon County near the Town of Garvin.

2.2 PROPOSED ROUTES

After an extensive route development process that studied and analyzed numerous potential routes and route segments, the Applicant identified two potential routes for the Project to be included in this Application. These proposed routes, the "Purple Route" and the "Blue Route" traverse Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon counties. The length of the Project will be approximately 171 or 174 miles, depending on which route is selected by the Commission. Figure 1.0-1 shows an illustrative overview of the Project and Appendix C includes detailed aerial maps of the route options and connector segments described in this Application.

For either proposed route option, the Applicant proposes to construct the 345 kV transmission lines as a monopole double-circuit design.

2.2.1 Green Segment

The Green Segment will serve as an interconnection between the Sherco Substation and the Sherco Solar West Substation; as such, it will be common to both the Purple and Blue Routes. To accommodate the second 345 kV circuit on the Green Segment, davit arms will be installed on existing Line 5651 and eight new structures will be installed adjacent to the existing dead-end structures. The Green Segment will not require additional right-of-way because the existing 150-foot right-of-way will be sufficient for adding a second circuit to the Applicant's existing Line 5651.

2.2.2 Purple Route

The Purple Route is the westernmost route proposed by the Applicant for the Project and is approximately 171 miles long, crossing Sherburne, Wright, Stearns, Meeker, Kandiyohi, Chippewa, Renville, Yellow Medicine, and Lyon counties (refer to Figure 1.0-1). A detailed description of the Purple Route is provided in Section 4.1.

The Purple Route predominantly follows property lines, agricultural field lines, and roads where practicable. The Purple Route also follows existing transmission lines where it crosses the Mississippi and Minnesota Rivers.

2.2.3 Blue Route

The Blue Route is the easternmost route proposed by the Applicant for the Project, and is approximately 174 miles in length, traversing Sherburne, Stearns, Meeker, Kandiyohi, Renville, Redwood, and Lyon counties (refer to Figure 1.0-1). A detailed description of the Blue Route is provided in Section 4.2.

Similar to the Purple Route, the Blue Route predominantly follows property lines, agricultural field lines, and roads where practicable. The Blue Route also follows an existing transmission line where it crosses the Minnesota River.

2.3 ROUTE WIDTH

When the Commission issues a route permit, it designates a "route" for a new transmission line. A "route" may have "a variable width of up to 1.25 miles," within which the right-of-way for the transmission facilities can be located. The right-of-way is the physical land area within a route that is needed to construct and operate the transmission line.

A route should be wide enough to provide flexibility for the permittee to work with landowners to address concerns and to address engineering issues that may arise after a Route Permit is issued. This Application identifies the Applicant's requested route widths for the Project, as well as the proposed right-of-way. As discussed in Section 2.5. the Applicant generally proposes a right-of-way that is 150 feet wide, located within the requested route width. The Commission's practice is to identify an "anticipated alignment" in its Route Permit decisions. Accordingly, the Applicant has developed what it currently believes to be the likely alignments for the Purple and Blue Routes that minimize the overall potential impacts based on the routing factors identified in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100. These alignments are referred to as the "Application alignments." These Application alignments may require modifications after a Route Permit is issued due to limitations inherent in identifying an alignment absent detailed survey and engineering work, site review, and design. The Application alignments that were developed for purposes of evaluating the potential impacts of each proposed route are available on the detailed maps in Appendix C. The Applicant completed a preliminary design for each route based on the information known at the time of the filing of this Application.

Once the Commission issues a Route Permit with route and an "anticipated alignment," a final alignment will be developed after discussions with individual landowners and agencies with permitting responsibilities and performing detailed survey and engineering work, site review, and design. The final alignment will be provided to the Commission through the Plan and Profile submission and review process. As part of that submission, the Applicant will inform the Commission as to where deviations in the final alignment from the "anticipated alignment" occur.

For this Project, except as otherwise noted below, the Applicant generally requests a route width of 1,000 feet for the Purple and Blue Routes and all connector segments. For the Green Segment, the Applicant requests a route width of 150 feet, which corresponds to the 150-foot right-of-way for the existing transmission line (Line5651).

The Applicant also requests an additional route width between 0.5 mile and up to 1.25 miles surrounding the Terminal, Intermediate, and Voltage Support substations to provide flexibility in substation location and routing the lines in and out of the substations. The wider route widths requested correspond to the approximate locations where the Applicant will site the new substations and will accommodate the Applicant's plan to avoid siting the new substations in areas where resources such as wetlands, waterbodies, public lands, native plant communities, residences, and historic sites exist. There are other locations along the Purple and Blue Routes where the Applicant is requesting additional route widths, specifically near areas where natural resources and state conservation easements exist which the Applicant intends to avoid to the extent

practicable. Locations where a wider route width is requested are summarized in Table 2.3-1 and depicted on Figure 2.3-1 and in Appendix C.

Table 2.3-1 Summary of Additional Route Widths Requested

Explanation for Additional Route Width Requested	Route Width (miles)[1]	Length Along the Route (miles)	Township	Range	Sections	Appendix C Map Page
Purple Route						
1-Voltage Support Substation Siting Area	0.50	5.53	118	35	2, 3, 4, 5, 6	11, 12
				36	1	
			119	35	31, 32, 33, 34, 35	
				36	36	
2 – Conservation Easement	0.32	0.50	118	36	9	13
3 – Intermediate Substation Siting Area	1.25	7.51	111	40	6, 18, 19, 30	21, 22
				41	1, 12, 13, 24, 25	
			112	40	19, 30, 31	
				41	24, 25, 36	
4 – Intermediate Substation Siting Area	1.25	3.31	110	41	2, 3, 10, 11	22
			111	41	22, 26, 27, 34, 35	
Terminal Substation	0.48	N/A	109	41	23	24
Blue Route						
1-Voltage Support Substation Siting Area	1.25	15.70	116	32	6	10, 11, 12
				33	1	
			117	32	3, 4, 5, 6, 7, 18, 19, 30, 31	
				33	1, 12, 13, 24, 25, 36	
			118	32	3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 31, 32, 33, 34	

Table 2.3-1 Summary of Additional Route Widths Requested						
Explanation for Additional Route Width Requested	**Route Width (miles)[1]**	**Length Along the Route (miles)**	**Township**	**Range**	**Sections**	**Appendix C Map Page**
				33	36	
			119	32	33, 34	
2 – Conservation Easement	0.80	1.92	112	34	8, 9, 16, 17, 18, 19, 20, 21	17
3 – Intermediate Substation Siting Area	1.25	5.30	111	37	19, 30	21, 22
				38	20, 21, 22, 23, 24, 25, 26, 27, 28, 29	
4 – Intermediate Substation Siting Area	1.01	2.86	110	38	7, 8, 17, 18	22
				39	11, 12, 13, 14	
5 – Conservation Easement	1.25	2.22	110	39	3, 4, 5, 8, 9, 10, 15, 16, 17	23
Terminal Substation	0.48	N/A	109	41	26	25
[1] Measured from the widest point of the requested route width.						

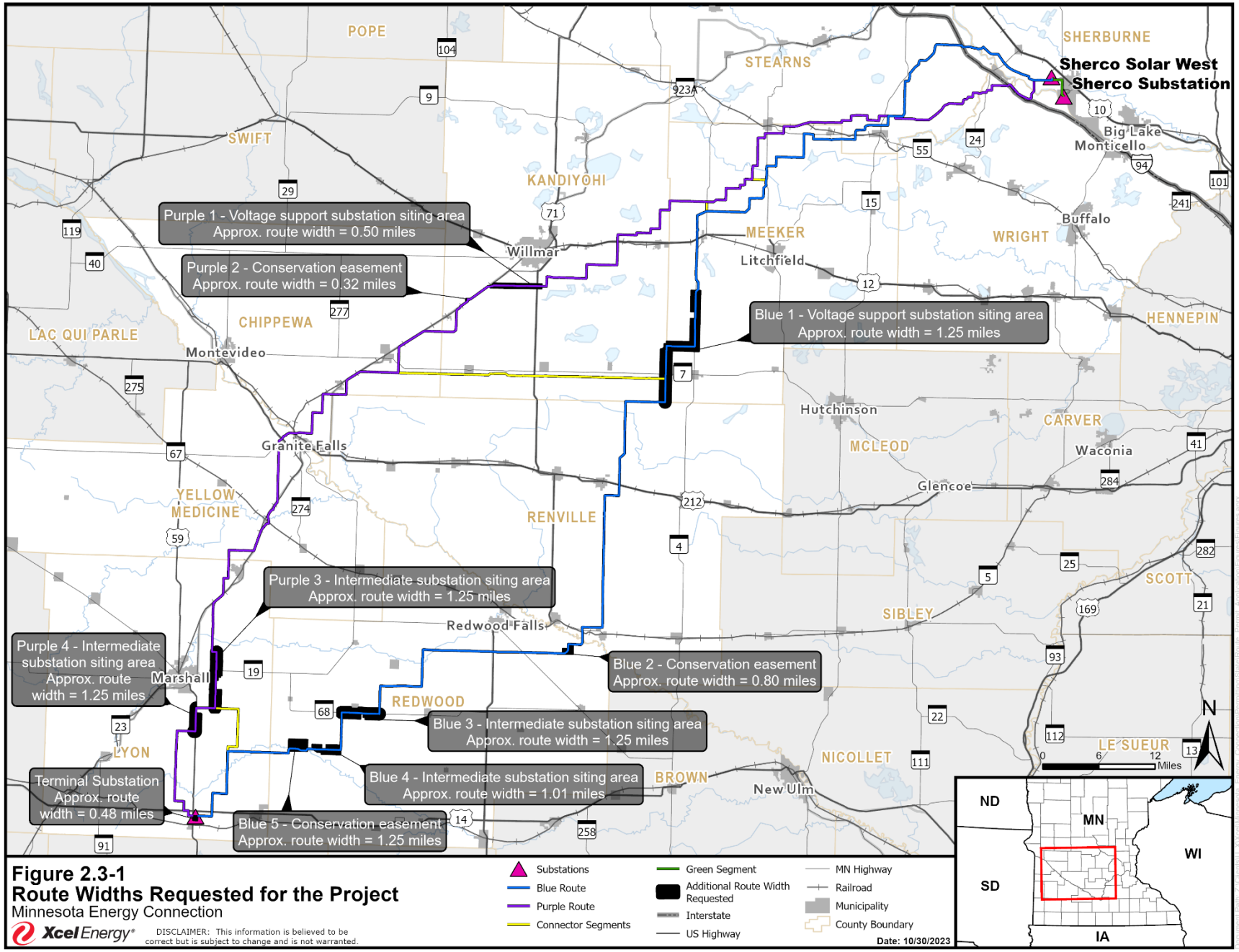


Figure 2.3-1
Route Widths Requested for the Project
Minnesota Energy Connection

Xcel Energy®

DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.

2.4 TRANSMISSION STRUCTURE AND CONDUCTOR DESIGN

The new double circuit 345 kV transmission line would be constructed primarily of single (monopole) steel pole structures. For angles and dead-end structures, a multiple pole design will be used. All transmission structures will be a double-circuit 345 kV/ 345 kV design and proposed to be weatherizing steel. Other specialty structures may be used depending on site-specific conditions.

The proposed structures will typically range in height from approximately 90- to 160-feet tall; however, where existing transmission lines are crossed, structure heights could be up to 195 feet tall. The typical spans between structures will be about 1,000 feet. The structures will typically be installed on a drilled pier concrete foundation usually approximately 30 to 40 feet in depth. Specialty foundations may be required due to geotechnical (or soil) conditions. Foundation depth will be based on site-specific conditions and detailed engineering design and could be up to 60 to 70 feet in depth. Table 2.4-1 summarizes the typical structure designs for the transmission line.

Table 2.4-1 Typical Structure Design Summary [1]

Line Type	Structure Type	Structure Material	Structure Height (feet)	Foundation Diameter (feet)	Typical Span Between Structures (feet)
345 kV Double-circuit Tangent, Small and Medium Angles	Monopole with Davit Arms	Weathering steel	90 - 160	7-10	1,000
345 kV Double-circuit Large Angle and Dead-end	Two-poles with Davit Arms			Up to 12	

[1] Structure sizes may change based on site conditions and further analysis of proposed routes.

A single circuit transmission line carries three phases (conductors) and separate shield wire(s). A double circuit transmission line carries six phases (conductors) and two separate shield wires. Each 345 kV line will utilize bundled (twisted pair) 2x636 kcmil Aluminum Conductor Steel Reinforced or similar performance conductor. These double bundled conductors will have a capacity equal to or greater than 3,000 amps. This type of conductor is the preferred conductor in areas of icing with wind that can lead to galloping. Galloping is where conductors oscillate in large vertical motion due to wind or ice loading and can result in outages or damage to insulators causing mechanical failures. If the galloping action is significant, it can cause phase-to-phase

and phase-to-ground faults. The design of two twisted pair conductors in a bundled configuration reduces aeolian vibration due to its changing cross-section.

The Project will be designed to meet or surpass relevant local and state codes including National Electric Safety Code® (NESC) and Xcel Energy standards. Applicable standards will be met for construction and installation, and applicable safety procedures will be followed during design, construction, and after installation.

Figure 2.4-1 provides photos of typical double-circuit structures that the Applicant proposes to use for this Project. Technical diagrams of these proposed structure types are included in Appendix D.

Figure 2.4-1 Photos of Typical 345 kV Structures

Typical Double Circuit Structures | Typical Dead-end Structures

2.5 TRANSMISSION LINE RIGHT-OF-WAY

The Applicant anticipates constructing the new double circuit 345 kV transmission line facilities using structures that require a 150-foot-wide right-of-way. When paralleling existing road rights-of-way, the Applicant proposes to place poles on adjacent private property, approximately a 10-foot offset from the existing road right-of-way, subject to easements with landowners, as well as road authority design requirements that could affect the offset distance. In areas where a 10-foot offset is not feasible, poles may be placed inside road rights-of-way subject to the road authority's utility accommodation policy. These pole placements allow the transmission line right-of-way to share existing road rights-of-way to the greatest extent feasible and may reduce the overall size of the easement required from the private landowner. Pole placement and offset distances may vary in areas such as highway interchanges due to county or state design requirements and in areas of planned future road expansion.

As stated in Section 2.1, the Green Segment will not require any additional right-of-way. The Applicant also does not currently anticipate that any construction or relocation will be necessary on any existing transmission lines crossed by the new double circuit 345 kV transmission line. At the time of final design of the Project; however, the Applicant may determine that short segments of existing transmission lines crossed by the new transmission line or at substations may need to be relocated or reconstructed to ensure NESC and Applicant design criteria and clearances are maintained. If such lines are not owned by Xcel Energy, the Company will coordinate with the transmission line owner. Likewise, Xcel Energy will coordinate with any distribution line owners regarding relocation, as applicable.

2.6 ASSOCIATED FACILITIES

Associated facilities for the proposed Project include modifications to the existing Sherco Solar West Substation and the Sherco Substation, a new Terminal Substation in Lyon County, a new Voltage Support Substation near the approximate midpoint of the transmission line, and a new Intermediate Substation about 20 miles north of the Terminal Substation.

With the exception of the Sherco Substation, Sherco Solar West Substation, and the Terminal Substation, the precise location of the substations is not known at the time of this Application filing and cannot be determined until a route is chosen by the Commission. The Applicant is requesting additional route width for both proposed routes in the general areas where the substations would be needed (refer to Section 2.3). The Applicant intends to seek agreement with willing landowners for the location of the new substations; this acquisition process is ongoing, and the Company will provide any updates regarding the status of those acquisition efforts as part of the route permit

proceeding. In general, the Applicant is working to identify a location for each facility that avoids environmentally sensitive areas including but not limited to, wetlands, public lands, native plant communities, and historic sites.

2.6.1 Existing Substation Modifications

The Sherco Solar West Substation, owned by Xcel Energy, is the northern endpoint of the proposed double circuit 345 kV transmission line. This substation is located just outside the City of Becker, adjacent to Xcel Energy's Sherco Solar West solar facility and interconnects the solar facility with the Sherco Substation via the Sherco Solar West 345 kV transmission line (Line 5651). To accommodate this Project, the Sherco Solar West Substation will require expansion entirely on Xcel Energy property and installation of new substation equipment such as: breakers, switches, continuously variable transmissions (CVTs), arresters, and bus work. The Project will connect the Sherco Solar West Substation and the Sherco Substation via the Green Segment proposed in this Application, which is proposed to be a new second circuit to be added to existing Line 5651. This interconnection is accounted for within the route width requested in this Application.

Modifications at the Sherco Substation will also be necessary to accommodate termination of the second circuit between Sherco and Sherco Solar West Substations as part of this Project. However, no expansion will be required as all additional equipment will be installed within the existing fence line of the substation.

2.6.2 Voltage Support Substation

Xcel Energy proposes constructing a new 345 kV Voltage Support Substation approximately 80 miles south of the Sherco Solar West Substation. This substation is currently proposed to include a Series Capacitor and one 150 megavolt amp of reactive power (MVAR) static synchronous compensator (STATCOM) system per line. Selection of voltage support equipment will be dependent on the technologies available at the time of construction and the resources selected to interconnect to the line. A control building and road access will also be constructed at the site. The Voltage Support Substation footprint will be approximately 30 acres in size. Xcel Energy will seek to purchase property that is approximately 40 to 80 acres in size to accommodate the substation footprint and additional acreage that may be needed for transmission line connections.

2.6.3 Intermediate Substation

Xcel Energy proposes to construct an Intermediate Substation approximately 20 miles north of the Terminal Substation in Lyon County and the terminus of the double circuit

345 kV transmission line. The Intermediate Substation will occupy an approximately 20-acre footprint and facilitate the interconnection of renewable resources to that substation. A control building and road access will also be constructed at the site. Xcel Energy will seek to purchase property that is approximately 40 to 80 acres in size to accommodate the substation footprint and additional acreage that may be needed for future line connections, including connections for new generators.

2.6.4 Terminal Substation

The new Terminal Substation in Lyon County would be the southern endpoint of the transmission line. This substation would be located approximately 1 mile north of the Town of Garvin, south/southeast of the intersection of U.S. Highway 14 and U.S. Highway 59. The Terminal Substation will facilitate the interconnection of renewable resources to that substation.

The substation will be approximately 40 acres in size and include the installation of two 116/-58 MVAR synchronous condensers, shunt reactors, breakers, switches, CVTs, arresters, and bus work. A control building and road access will also be constructed at the site. The Applicant has secured purchase options with two landowners for a total of 160 acres that could be used for selecting the final 40–acre substation site to provide siting flexibility and setbacks from residences and to accommodate interconnections from future wind generation in the area.

2.7 PROJECT SCHEDULE

An anticipated permitting and construction schedule for the Project is provided in Table 2.7-1. This schedule is based on information known as of the date of filing and may be subject to change as further information develops or if there are delays in obtaining the necessary federal, state, or local approvals that are required prior to construction. Xcel Energy's approved IRPs directs the company to close all Sherco coal-fired units by 2030. The schedule in Table 2.7-1 reflects the Applicant's anticipated in-service date for the Project in the third quarter of 2027 to meet energy and capacity needs associated with the retirement of the Sherco units.

The proposed Project will connect new renewable energy generation to the electrical grid as coal operations cease at Sherco and will allow Xcel Energy to reuse its valuable and existing transmission interconnection rights. Interconnection rights are a valuable asset in part because the regional transmission grid is congested. The regional system does not currently provide enough transmission capacity to accommodate all the renewable energy projects that wish to interconnect. Interconnection delays and high estimated upgrade costs are expected to persist. By reusing the Applicant's existing interconnection rights, the Project will speed up the addition of renewable energy

resources that are needed to replace power generation that will be lost when the Sherco coal plants are retired.

The transmission line would be placed in service in 2027. Substation additions at the Terminal Substation and the Voltage Support Substation are expected to be completed by September 30, 2031.

Table 2.7-1 Anticipated Project Schedule

Activity	Estimated Dates
Preliminary Land Acquisition for Substation Sites Begins	Q2 2023
Preliminary Easement Landowner Engagement/Access Begins	Q3 2024
Survey and Transmission Line Design Begins	Q3 2024
Minnesota Certificate of Need and Route Permit Issued	Q1 2025
Easement Acquisition Begins	Q2 2025
Other Federal, State, and Local Permits Issued	Throughout 2025, Completion by Q3 2025
Start Right-of-Way Preparation	Q3 2025
Start Project Construction	Q3 2025
Gen-tie Lines Placed In-Service	Q3 2027
Project Complete with All Substations Voltage Support Installed	Q3 2031

Additional details about reuse of existing interconnection rights and the estimated costs of MISO interconnection are provided in Xcel Energy's CN application, filed under Docket No. E002 /CN-22-131.

2.8 PROJECT COSTS

For purposes of this Application, the Applicant developed route-specific costs based on the estimates developed for the CN application for a 160- to 180-mile-long route. The methodology for the CN was included in Chapter 2 of the CN application and restated here.

There are several main components of these cost estimates, (1) transmission line structures and materials; (2) transmission line construction and restoration; (3) transmission line permitting and design; (4) transmission line and substation right-of-way acquisition; and (5) substation materials, permitting, design, and construction. Each of these components also includes a risk contingency and financing expenses, Allowance of Funds Used During Construction (AFUDC).

To prepare a cost estimate for the transmission line portions of the Project, Xcel Energy relied in part upon the actual costs incurred for constructing the Huntley-Wilmarth 345 kV Project, construction of which was completed in October 2021. Xcel Energy updated this data based on current market conditions and included a contingency factor. The estimate values are based on long straight alignments. The introduction of many corner structures and/or an alignment that jumps across features will have a cost increase. Right-of-way cost estimates for the transmission line and substations were based on a 150-foot right-of-way for the transmission line and 40 to 80 acres for each substation. Xcel Energy considered actual costs from prior project acquisitions and approximated the number of easements required to estimate the overall land acquisition costs.

To estimate substation construction costs, Xcel Energy identified the necessary components for each substation. Xcel Energy then estimated material, construction, design, and permitting costs based on cost estimates for these items from prior substation improvement projects.

To calculate an appropriate risk contingency, Xcel Energy identified potential risks that could result in additional costs. These risks include unexpected weather conditions, poor soil conditions as no geotechnical borings have been obtained, transmission line outage constraints, potential shallow rock, river crossings, labor shortages, and market fluctuations in material pricing and labor costs. Xcel Energy then developed an appropriate cost contingency for each of these risks and applied them to each of the cost categories above.

In the CN application, Xcel Energy estimated that construction of the Project, including substation construction and all substation equipment, including STATCOMs and series compensation, will cost $1.14 billion, representing the sum of the expenditures over the life of the Project. These costs include all transmission line costs, three new substations and modifications at Sherco Substation and Sherco Solar West Substation. Project costs include materials, construction, permitting and design costs, risk contingencies, AFUDC, and right-of-way/land acquisition costs.

The transmission line is expected to cost approximately $3.8 million per mile (including land acquisition). Applying this per line cost to the routes proposed in this Application, the Project costs are as shown in Table 2.8-1.

Table 2.8-1 Project Cost Estimates		
Route Option	**Purple Route/Green Segment Estimated Cost**	**Blue Route/Green Segment Estimated Cost**
Transmission Line	$657 million	$668million
Green Segment	$6.6 million	$6.6 million
Sherco Solar West Substation Modifications	$9 million	$9 million
Sherco Substation Modifications	$12.2 million	$12.2 million
Voltage Support Substation	$255 million	$255 million
Intermediate Substation	$24 million	$24 million
Terminal Substation	$164 million	$164 million
Total	**$1.128 billion**	**$1.139 billion**

Cost estimates for the connector segments identified by the Applicant are shown in Table 2.8-2. These costs are the total costs for these connector segments. The Applicant has not estimated the total route cost for a route using these connector segments. Using similar cost per mile basis ($3.8 million per mile) for transmission line and right of way cost noted above, the connector segments are estimated below:

Table 2.8-2 Change in Total Project Costs with Connector Segment		
Connector Segment	**Segment Length (miles)**	**Total Segment Cost**
Connector A	1.5	$5.7 million
Connector B	1.0	$3.8 million
Connector C	28.7	$109.1 million
Connector D	8.1	$30.4 million

Refer to Chapter 2 of the CN application (Docket No. E002/CN-22-131) for more detailed information on the Applicant's cost analysis.

2.9 DESIGN OPTIONS TO ACCOMMODATE FUTURE EXPANSION

As discussed in the CN application, the proposed Project is needed to ensure that sufficient energy resources could be interconnected to the Company's system in the timeframe needed to meet Xcel Energy's resource and capacity requirements, as well as achieve clean energy goals cost effectively and to make efficient reuse of the Company's interconnection rights at the Sherco Substation after the coal units retire. The Project will enable the interconnection and delivery of 1,350 MW to Sherco in 2027. An additional 250 MW can be added in 2031 and in 2032, 450 MW for a total of 2,150.

The Terminal, Intermediate and Voltage Support stations will be designed to enable expansion in the future to support additional generation interconnections in the future. Xcel Energy intends to voluntarily acquire land sufficient for the initial buildout and interconnection of future renewable facilities.

3.0 ROUTE SELECTION PROCESS

The Applicant conducted a thorough and systematic route selection process beginning in 2022 and extending through mid-2023. This process included consideration of statutory and rule requirements, information gathering, public outreach and input (including multiple rounds of public meetings), and comparison of route segments and alignments. Considerable public and agency outreach and information gathering was conducted in the Project area. The Applicant also met with state and local agencies as part of the outreach program for the Project. The Applicant developed a GIS database of information gathered from publicly available data resources and from on-site field review efforts that was used to compare the merits of various routing options with a goal of developing Application routes that minimize impacts to sensitive resources to the extent practicable.

This process resulted in the identification of two routes and four connector segments between the routes presented in this Application. A more detailed description of each step in the route selection process is provided below.

3.1 SUMMARY OF ROUTE SELECTION PROCESS AND STATE ROUTING CRITERIA

In Xcel Energy's recent IRP processes, the MPUC approved a plan allowing Xcel Energy to reduce its greenhouse gas emissions in part by retiring the remaining Sherco Unit 3 by 2030. The Commission also found that Xcel Energy proved it needs to procure 600 MW of solar and 2,150 MW of wind, or an equivalent amount of energy and capacity from a combination of wind, solar, and/or storage between 2027 and 2032 to meet energy and capacity needs.

During the IRP proceeding, Xcel Energy proposed a plan to connect to the required wind and solar resources. The plan requires two 345 kV transmission lines between Lyon County and the existing Sherco Substation. Connecting at the Sherco Substation allows reuse of Xcel Energy's existing and valuable interconnection rights. In the April 2022 IRP order, the Commission directed Xcel Energy to begin proceedings to obtain a CN and Route Permit for the two 345 kV transmission lines. Since that time, Xcel Energy has undertaken the route analysis and identification process described in this Application. The Company believes that the extensive public and agency outreach already conducted will facilitate the Commission's review of this Project.

The Applicant developed a Routing Study Area boundary between the two Project endpoints that includes all or portions of Sherburne, Stearns, Wright, Swift, Kandiyohi, Meeker, McLeod, Carver, Lac qui Parle, Chippewa, Renville, Sibley, Yellow Medicine, Redwood, Brown, Nicollet, Lincoln, Lyon, Murray, and Cottonwood counties. The

Routing Study Area is the same as the Notice Area described in the CN application and used for the Notice Plan filing. The Routing Study Area covers an area of approximately 8,969 square miles and is approximately 102 miles long and 120 miles wide at its longest and widest points. The Routing Study Area is depicted in Figure 3.1-1. As described further below, the Applicant has subsequently narrowed the Routing Study Area to identify the proposed routes for this Project.

The Applicant applied the criteria set forth in Minnesota Statutes section 216E.03, subdivision 7, and Minnesota Rule 7850.4100 in its route development process. These criteria guide the Commission's decision when selecting a route for a high voltage transmission line.

Minnesota Statutes section 216E.03, subdivision 7(a) provides that the Commission's route permit determinations "must be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure." Subdivision 7(e) of the same section requires the Commission to "make specific filings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the Commission must state the reasons."

In addition to the statutory criteria noted above, Minnesota Statutes section 216E.03, subdivision 7(b), as amended, and Minnesota Rule 7850.4100 provide factors the Commission will consider in determining whether to issue a route permit for a high voltage transmission line. These factors are:

A. Effects on human settlement, including, but not limited to: displacement, noise, aesthetics, cultural values, recreation, and public services;

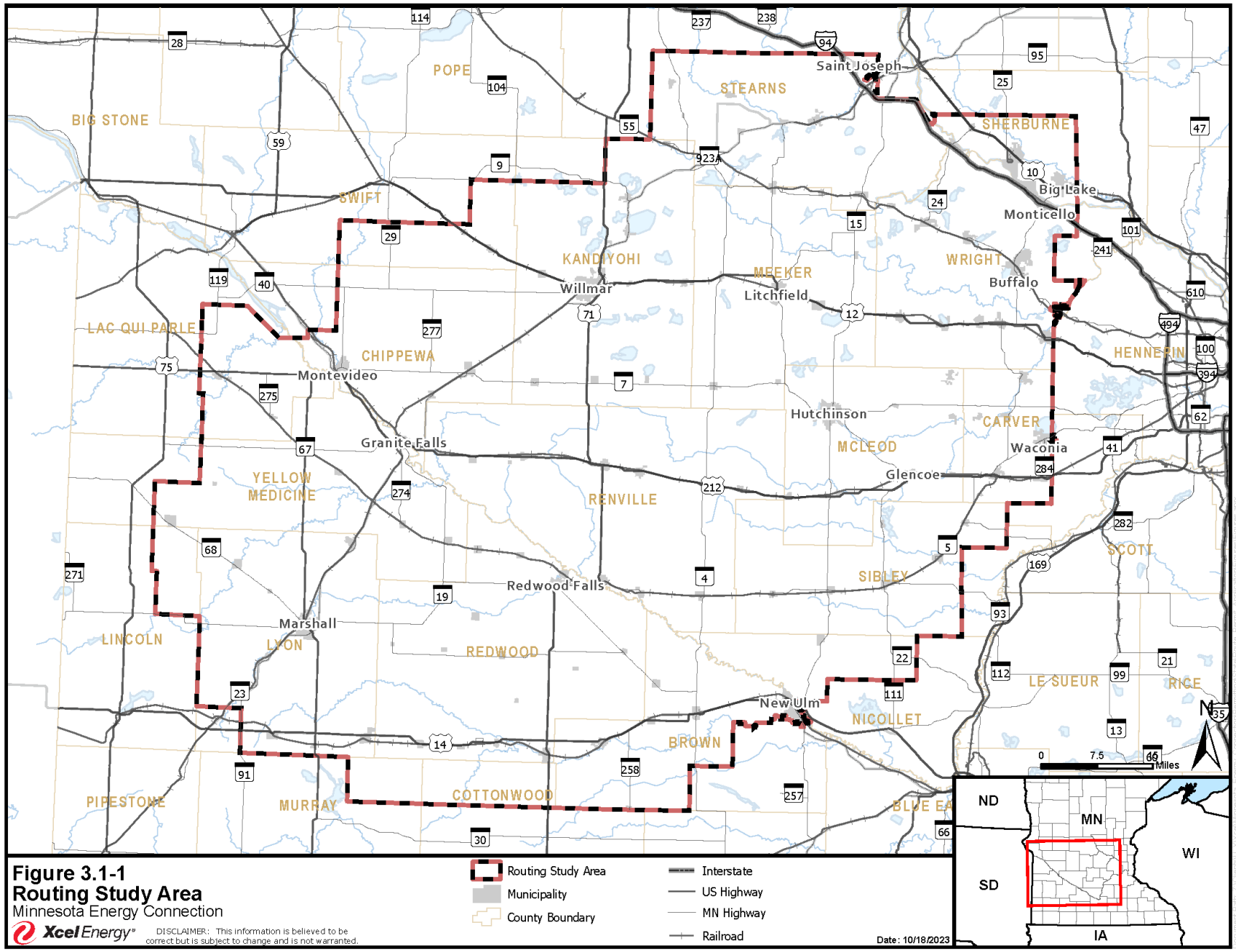
B. Effects on public health and safety;

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;

D. Effects on archaeological and historic resources;

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna;

F. Effects on rare and unique natural resources;


POPE
STEARNS
Saint Joseph
SHERBURNE
BIG STONE
SWIFT
KANDIYOHI
Willmar
MEEKER
Litchfield
WRIGHT
Buffalo
Big Lake
Monticello
LAC QUI PARLE
CHIPPEWA
Montevideo
HENNEPIN
Hutchinson
CARVER
Waconia
MCLEOD
Granite Falls
Glencoe
YELLOW MEDICINE
RENVILLE
SCOTT
SIBLEY
Redwood Falls
Marshall
LINCOLN
LYON
REDWOOD
LE SUEUR
RICE
New Ulm
NICOLLET
BROWN
PIPESTONE
MURRAY
COTTONWOOD
0
7.5
15
Miles
ND
MN
WI
SD
IA
Figure 3.1-1
Routing Study Area
Minnesota Energy Connection
Xcel Energy®
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Routing Study Area
Municipality
County Boundary
Interstate
US Highway
MN Highway
Railroad
Date: 10/18/2023

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;

I Use of existing large electric power generating plant sites;

J. Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;

K. Electrical system reliability;

L. Costs of constructing, operating, and maintaining the facility which are dependent on design and route;

M. Adverse human and natural environmental effects which cannot be avoided;

N. Irreversible and irretrievable commitments of resources;

O. Evaluation of the protection and enhancement of environmental quality and the reliability of state and regional energy supplies;

P. Evaluation of socioeconomic factors; and

Q. Evaluation of employment and economic impacts in the vicinity of the facility site and throughout Minnesota, including the quantity and quality of construction and permanent jobs and their compensation levels.

3.2 ROUTE DEVELOPMENT PROCESS

The Applicant utilized a systematic process of identifying, refining, and comparing route options to arrive at the proposed route options and connector segments identified in this Application. The following steps were taken as part of this process:

- Establish boundaries for Routing Study Area
- Identify opportunities and constraints
- Conduct local government and agency outreach
- Conduct initial outreach in the routing study area
- Review initial route network in the field
- Hold public open house meetings
- Review and refine routes, run comparative analysis to remove most impactful routes

- Hold second round of open house meetings
- Review, refine routes, run comparative analysis to remove most impactful routes. optimize route segments and connect for end to end routes for Route Permit Application
- Conduct Constructability Review of End-to-End Routes.

The following sections summarize the route development process.

3.2.1 Routing Study Area

The Routing Study Area was designed to include an area large enough that a reasonable number of route options to connect the Sherco Substation to the Lyon County endpoint could be identified without it being so large as to encumber the analysis with excessive data and routing options that did not present reasonable alternatives. The purpose of identifying a Routing Study Area for the Project was to establish boundaries and limits for the information-gathering process (e.g., identifying environmental and land use resources, routing constraints, and routing opportunities) and the subsequent development of route options for the Project.

3.2.2 Identify Routing Constraints and Opportunities

After establishing a Routing Study Area, the next step was to identify potential routes and route segments that minimized impacts to humans and the environment. To do this, the Applicant identified routing constraints and opportunities within the Routing Study Area. To minimize impacts on the environment and affected landowners, the Applicant identified areas to avoid within the Routing Study Area. These areas include:

- Residences: No occupied residences within the transmission line's 150-foot-wide right-of-way.
- Municipal boundaries: No 150-foot-wide right-of-way for the transmission lines proposed through cities.
- Tribally owned properties: No routes through land owned by Tribal governments.
- Federally owned properties: No routes through U.S. Fish and Wildlife Service (USFWS) Waterfowl Production Areas (WPAs), Historic Landmarks, or publicly owned properties that were acquired with federal Land and Water Conservation Act funding.
- State-owned properties: No routes through State Parks, Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), or Aquatic Management Areas (AMAs).

- Lakes, Rivers, and Calcareous Fens: No routes are proposed that would require placement of a transmission structure foundation in a lake, river, or calcareous fen.
- Public Airports: No routes are proposed that would create an aviation hazard at a public airport per Federal Aviation Administration (FAA) and Minnesota Department of Transportation (MNDOT) regulations.
- Regional, County, and Municipal Parks: No routes are proposed that cross within the boundaries of these recreation lands.
- Cemeteries, Schools, Hospitals, Public Buildings: No routes are proposed that would include these facilities within the transmission line's 150-foot-wide right-of-way.

The Applicant also identified additional areas to avoid if practicable. These areas include:

- Conservation easements, such as Conservation Reserve Enhancement Program (CREP) and Reinvest in Minnesota (RIM), administered by the Minnesota Board of Soil and Water Resources (BWSR).
- Crossings of State Wild & Scenic Rivers where there is not an existing linear crossing.

The Applicant further sought to reduce overall Project impacts by minimizing route alignments that would span Sites of Biodiversity Significance (SOBS), Native Plant Communities (NPCs), native prairie, public water wetlands, and crossings of forested areas where tree clearing would be necessary.

Additionally, during public open houses, and in written comments received, the Applicant was made aware that proposing routes adjacent to existing transmission lines that were already located on field/property lines would increase the impacts to agricultural operations.

Routing opportunities in the Routing Study Area included:

- Locations where there was an opportunity to parallel a roadway, and potentially share public right-of-way between the transmission line and road, and avoid the constraints listed above.
- Locations where there was an opportunity to place the transmission centerline on a field or property line, where land uses could continue uninterrupted in the transmission line easement.

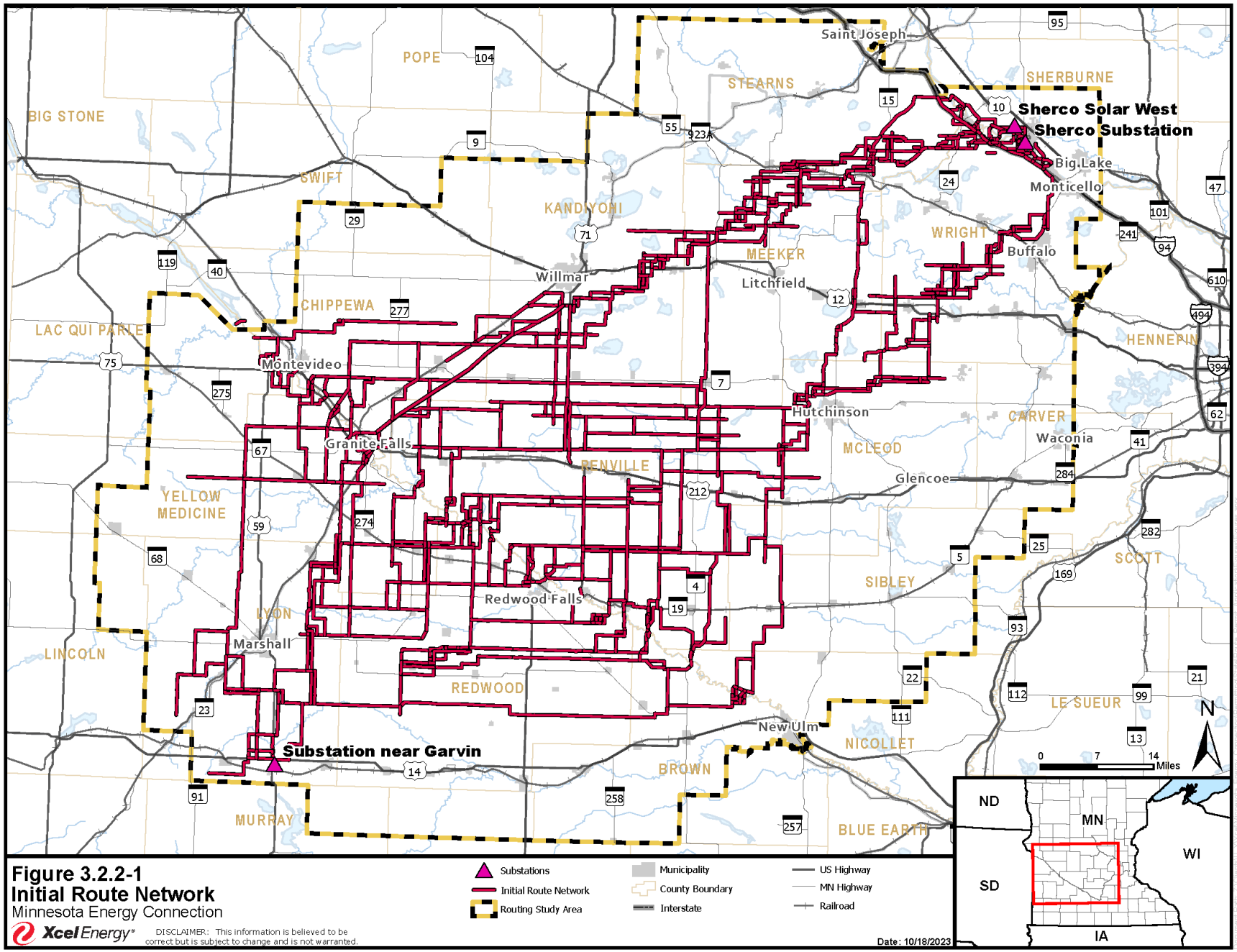
- Routes that reduce the number of two-pole angle or dead-end structures by following straight lines.
- At Wild & Scenic River crossings, routes that follow existing linear crossings of the river district.

The same constraints and opportunities were used in identifying the substation siting areas and will be used in selecting the final footprint for each.

Based on an examination of routing opportunities and constraints, the Applicant developed an Initial Route Network. The Initial Route Network included numerous route segments that, when combined, created various route combinations (refer to Figure 3.2.2-1).

The Applicant focused initial routing efforts at locations where identifying route options was most difficult due to existing constraints. These locations include crossing of the Mississippi River, crossing Interstate 94 (I-94) and the existing 345 kV CapX transmission line in an area where residences and other infrastructure exists, and the crossing the Minnesota River where natural resources and conservation easements are prevalent.

The Applicant found that route segment options in the northeast portion of the Routing Study Area were extremely limited by the presence of parks, waterbodies and lakes, and residential neighborhoods. As a result, there are no feasible routes south or southeast of the Sherco Substation. Figure 3.2.2-2 illustrates routing constraints in the area south of the Mississippi River.


Saint Joseph
POPE
STEARNS
SHERBURNE
BIG STONE
Sherco Solar West
Sherco Substation
Big Lake
Monticello
SWIFT
KANDIYOHI
WRIGHT
Buffalo
MEEKER
Willmar
Litchfield
CHIPPEWA
LAC QUI PARLE
Montevideo
HENNEPIN
Hutchinson
CARVER
Waconia
Granite Falls
MCLEOD
RENVILLE
Glencoe
YELLOW MEDICINE
SCOTT
SIBLEY
Redwood Falls
LYON
Marshall
LINCOLN
REDWOOD
LE SUEUR
New Ulm
NICOLLET
Substation near Garvin
BROWN
MURRAY
BLUE EARTH
N
0 7 14 Miles
ND
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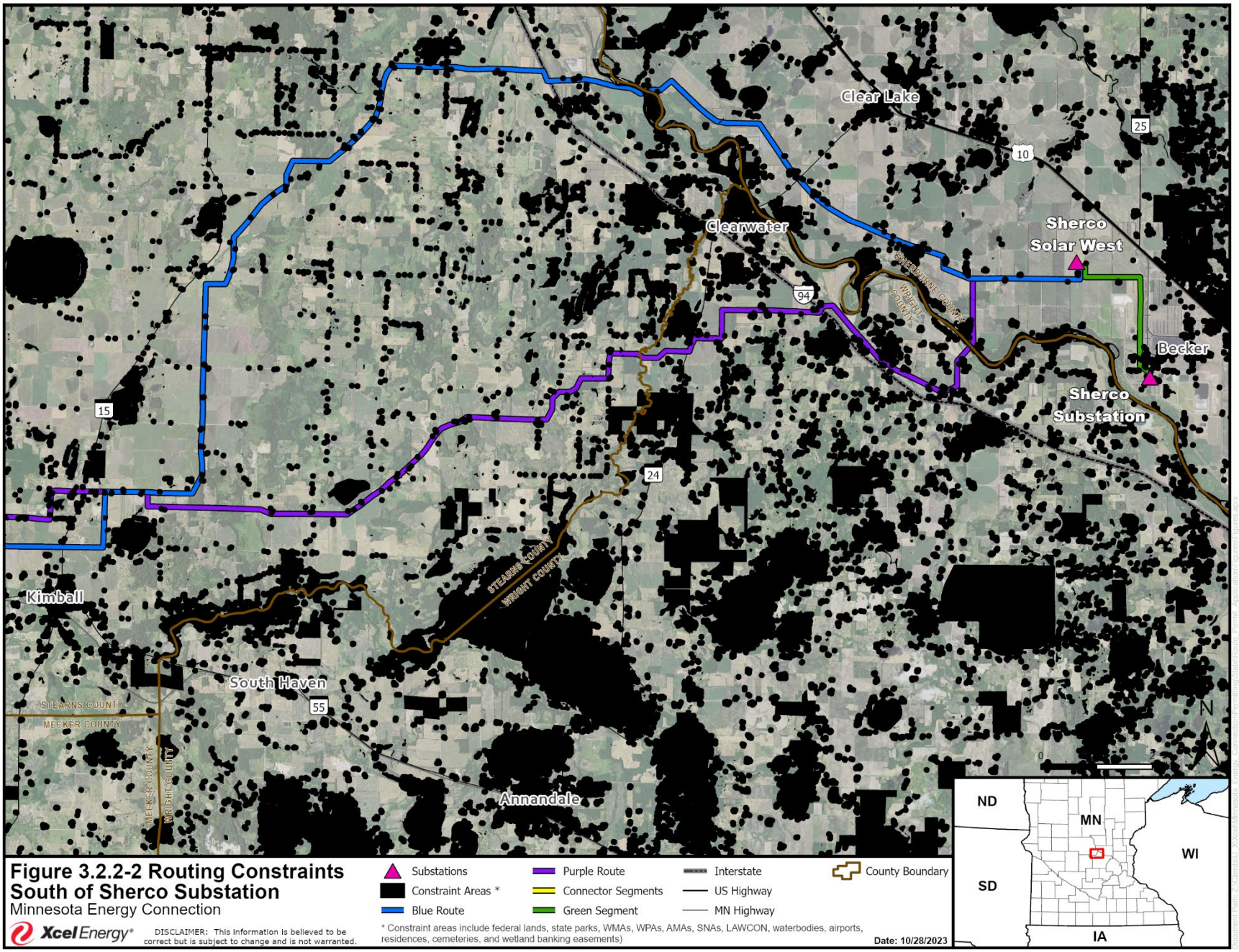
WI
SD
IA
Figure 3.2.2-1
Initial Route Network
Minnesota Energy Connection
Xcel Energy®
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Initial Route Network
Routing Study Area
Municipality
County Boundary
Interstate
US Highway
MN Highway
Railroad
Date: 10/18/2023


Clear Lake
Clearwater
Sherco Solar West
Becker
Sherco Substation
Kimball
South Haven
Annandale
STEARNS COUNTY
WRIGHT COUNTY
MEEKER COUNTY
SHERBURNE COUNTY
25
10
94
15
24
55
Figure 3.2.2-2 Routing Constraints South of Sherco Substation
Minnesota Energy Connection
Xcel Energy
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Constraint Areas *
Blue Route
Purple Route
Connector Segments
Green Segment
Interstate
US Highway
MN Highway
County Boundary
* Constraint areas include federal lands, state parks, WMAs, WPAs, AMAs, SNAs, LAWCON, waterbodies, airports, residences, cemeteries, and wetland banking easements)
Date: 10/28/2023
ND
MN
SD
WI
IA
N

3.2.3 Local Government, Agency, and Tribal Outreach

Following development of the Routing Study Area and Initial Route Network, meetings were held with state and local agencies (e.g., Minnesota Department of Natural Resources [MNDNR], MNDOT, and various county and local administrators). The Applicant also met with the Upper Sioux Community Pezihutazizi Oyate and coordinated with the Lower Sioux Indian Community due to the proximity of their communities' Tribal lands which occur within the Routing Study Area (but not, ultimately, within either the Purple or Blue Route). The purpose of these meetings was to gather feedback on the Initial Route Network and identify potential concerns. More details regarding outreach may be found in Section 7.0 of this Application.

3.2.4 Site Review of Route Network

After the desktop identification of the Initial Route Network, the Applicant performed an in-field site visit of the Project Study Area. Using data and information gathered from agency responses, county meetings, and the GIS constraints database developed for the Project, the Applicant investigated numerous route segments in the field and noted features not evident on aerial photos, reviewed route options for constructability considerations, and observed the context of each route.

3.2.5 Public Open House Meetings

Following the development of the Initial Route Network, and after incorporating route changes based on site review, the Applicant conducted six public open houses in Becker, Granite Falls, Hutchinson, Marshall, Redwood Falls, and Willmar. These meetings were held in February 2023 and two additional virtual open house sessions were held on March 6, 2023. Routes presented at these meetings are shown on Figure 3.2.5-1.

A second round of open house meetings was held in June 2023, with two additional virtual open house sessions held on June 20, 2023. This second round of public meetings consisted of seven meetings held in Becker, Granite Falls, Kimball, Litchfield, Marshall, Redwood Falls, and Willmar. The Applicant presented an updated route network with routes modified based on feedback received from public comments, additional field visits, and an ongoing comparative analysis of route segments. Routes presented at this second round of public meetings are shown on Figure 3.2.5-2.

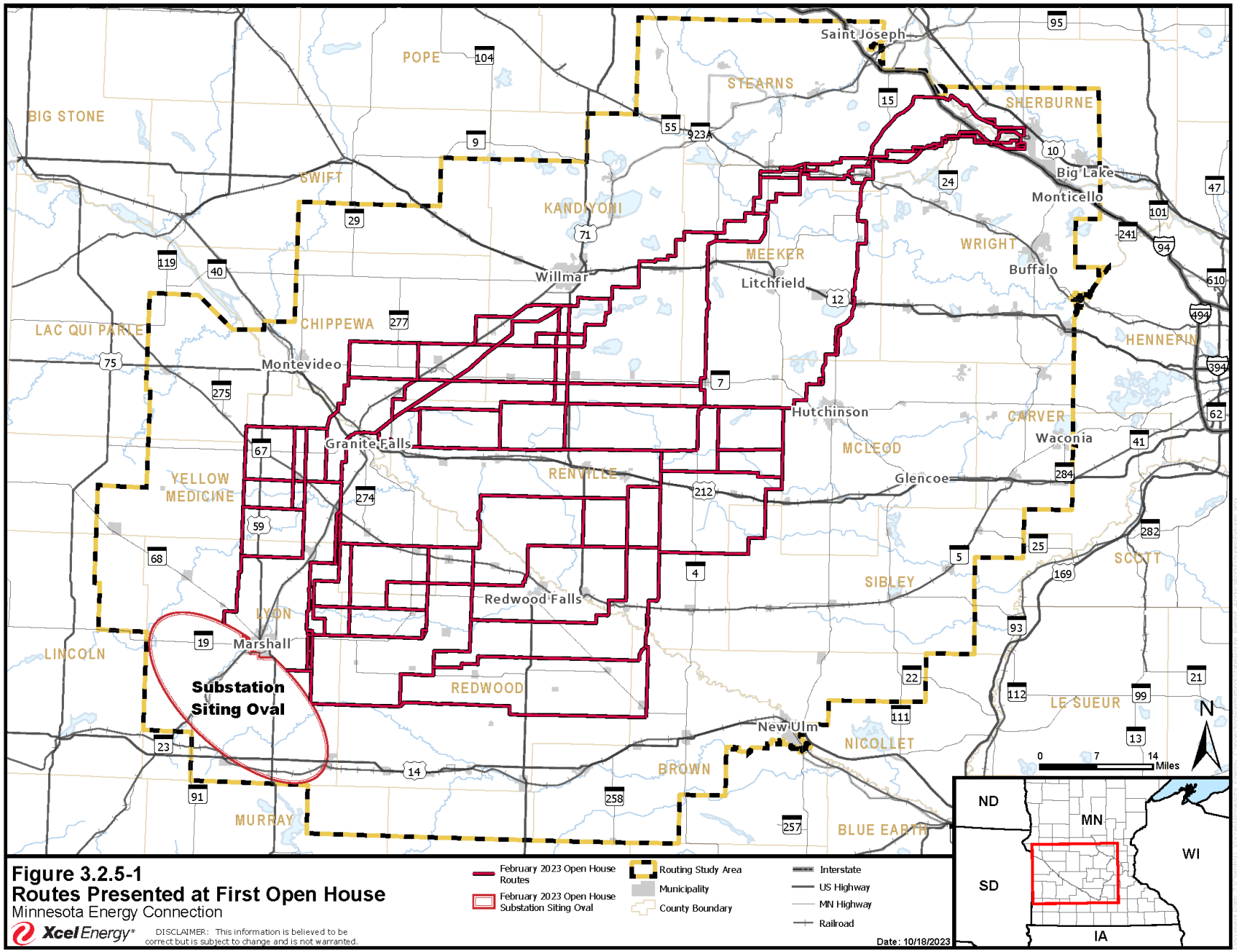
The Applicant provided notices for these open houses via newspaper and direct mail to residents, landowners, public officials, and other potential stakeholders (Appendix F). The open house invitation provided information such as a general Project description, a map of the Routing Study Area and preliminary route options, Xcel

Energy's Project website address, and Applicant's contact information to submit questions and comments.

The open house format had stations to display and communicate information about the Project to the attendees. Large-scale poster-sized maps were on display depicting the Routing Study Area and preliminary route options. Meeting attendees were encouraged to leave comments either at the meeting or following the meeting. Landowner feedback from these open houses included comments and concerns regarding the following: proximity to residences; minimizing impacts to farm operations; preference to follow existing infrastructure; visual impacts; historic and natural resources; energy costs; and other route development considerations. More information on the feedback received is available in Section 7.2.

The Applicant received approximately 400 and 310 comments from the first and second round of public open houses, respectively. The Applicant tallied each comment received and identified categories of common themes that commentors referenced as a concern (see Appendix G). Figure 3.2.5-3 depicts the location of comments received from each open house if an address was provided. These common themes are summarized below and in Section 7.0:

- Agricultural impacts and irrigation system avoidance/mitigation
- Importance of following section lines, roads, and highways away from residential areas
- Avoidance of municipal boundaries
- Impacts related to paralleling existing transmission lines (commenters expressed concerned about a second pole in an existing right-of-way and potential agricultural impacts)
- Environmentally sensitive areas
- Aesthetic impacts
- Safety
- Property values
- Proximity to residences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SHERBURNE
BIG STONE
SWIFT
KANDIYOHI
Big Lake
Monticello
MEEKER
WRIGHT
Buffalo
Willmar
Litchfield
LAC QUI PARLE
CHIPPEWA
HENNEPIN
Montevideo
Hutchinson
CARVER
Waconia
Granite Falls
MCLEOD
YELLOW MEDICINE
RENVILLE
Glencoe
SCOTT
SIBLEY
Redwood Falls
LYON
Marshall
LINCOLN
Substation Siting Oval
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LE SUEUR
New Ulm
NICOLLET
BROWN
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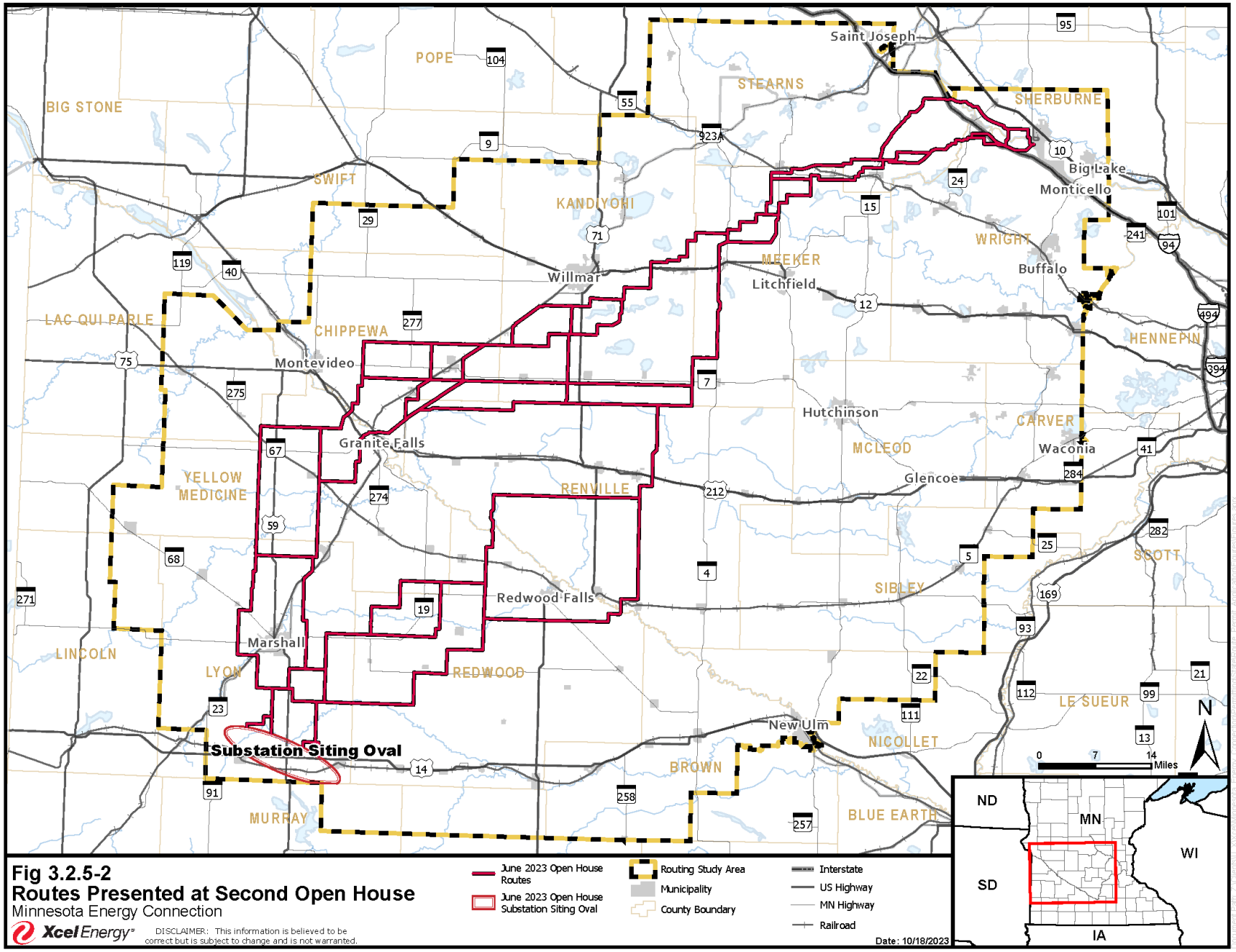
Figure 3.2.5-1
Routes Presented at First Open House
Minnesota Energy Connection
Xcel Energy®
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
February 2023 Open House Routes
February 2023 Open House Substation Siting Oval
Routing Study Area
Municipality
County Boundary
Interstate
US Highway
MN Highway
Railroad
Date: 10/18/2023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SHERBURNE
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Big Lake
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Granite Falls
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YELLOW MEDICINE
RENVILLE
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SCOTT
SIBLEY
Redwood Falls
Marshall
LINCOLN
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REDWOOD
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New Ulm
NICOLLET
Substation Siting Oval
BROWN
MURRAY
BLUE EARTH
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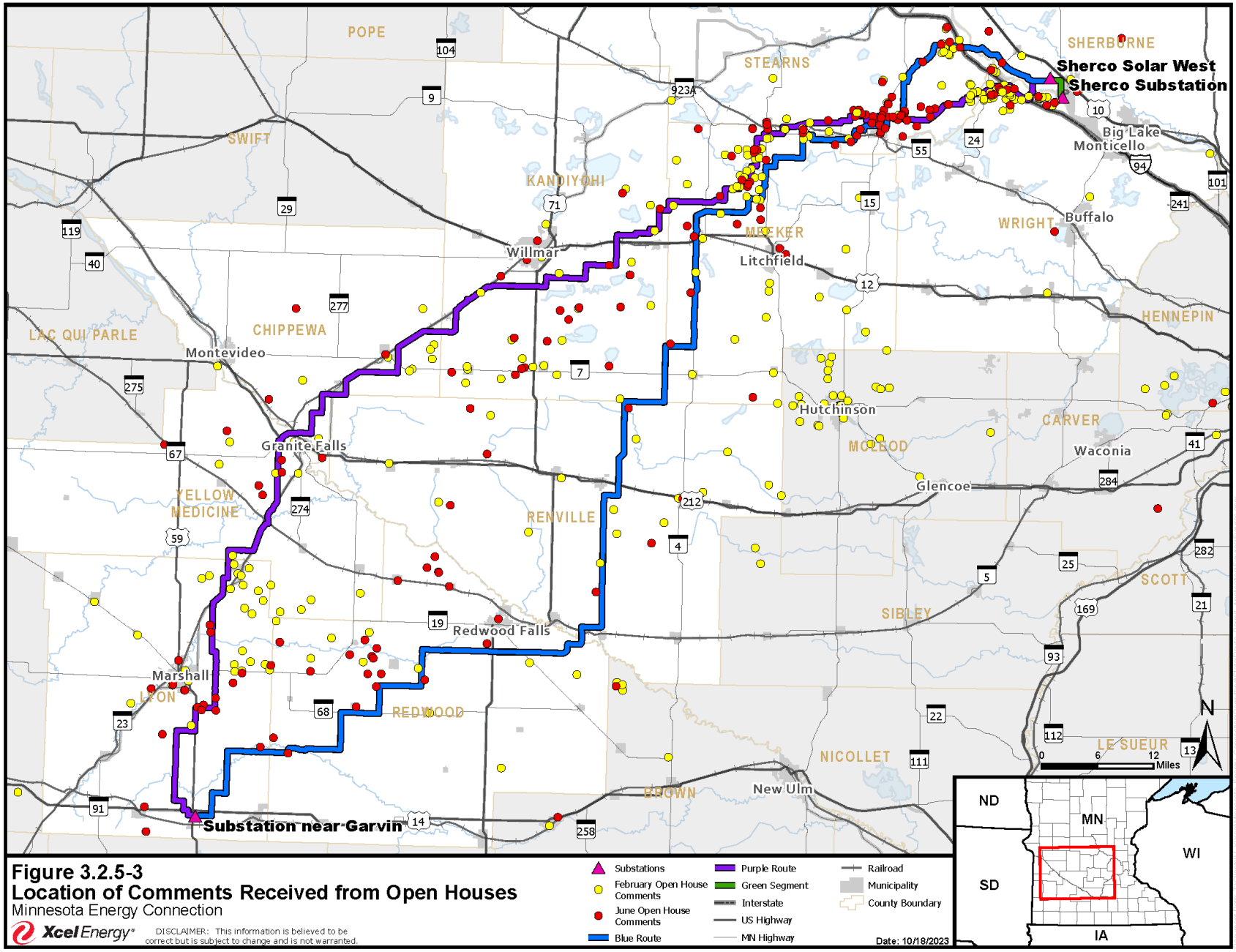
Fig 3.2.5-2
Routes Presented at Second Open House
Minnesota Energy Connection
Xcel Energy®
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
June 2023 Open House Routes
June 2023 Open House Substation Siting Oval
Routing Study Area
Municipality
County Boundary
Interstate
US Highway
MN Highway
Railroad
Date: 10/18/2023


POPE
SHERBURNE
STEARNS
Sherco Solar West
Sherco Substation
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KANDIYOHI
Big Lake
Monticello
WRIGHT
Buffalo
MEEKER
Litchfield
Willmar
HENNEPIN
LAC QUI PARLE
CHIPPEWA
Montevideo
Hutchinson
CARVER
MCLEOD
Waconia
Granite Falls
Glencoe
YELLOW MEDICINE
RENVILLE
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Redwood Falls
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LE SUEUR
BROWN
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Substation near Garvin
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Figure 3.2.5-3
Location of Comments Received from Open Houses
Minnesota Energy Connection
Xcel Energy
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
February Open House Comments
June Open House Comments
Blue Route
Purple Route
Green Segment
Interstate
US Highway
MN Highway
Railroad
Municipality
County Boundary
Date: 10/18/2023

3.3 ROUTE REFINEMENT AND ANALYSIS

Throughout route development process described in Section 3.2, the Applicant used a data-based analysis of route segments. This analysis is based on a comprehensive set of route comparison and evaluation criteria to compare the characteristics and potential impacts of different route segment combinations. The criteria were based on routing factors set forth in Minnesota Statutes section 216E.03, subdivision 7(b), and Minnesota Rule 7850.4100 and were categorized, generally, as human settlement, environmental, or engineering.

Route criteria data were tabulated for route segment comparisons on a scale from just a couple miles to over a hundred miles. For each set of segment comparisons, data was used to eliminate segments having the most impacts while focusing on incorporating less impactful segments into larger route segments.

3.3.1 Route Comparison Sections

The following describes the route comparison process in greater detail within the Routing Study Area in four sections:

- Sherco Substation to Mississippi River
- Mississippi River to North Fork of the Crow River
- North Fork of the Crow River to the Minnesota River
- Minnesota River to the Terminal Substation

Sherco Substation to Mississippi River

Six potential Mississippi River crossing locations were studied as shown on Figure 3.3.2-1. There were also three additional crossings identified early on which were not carried forward into this analysis. Two of these crossings were where existing transmission lines cross the Mississippi River near the Applicant's Monticello Nuclear Power Plant; however, there were no viable route options connecting these crossings to the south and southwest of the river due to the configuration of the river and other natural resources, and lack of available area for new a right-of-way to the southwest, and the density of residential developments to the south (refer to Figure 3.2.2-2). The Highway 24 bridge in City of Clearwater was also considered but eliminated from further consideration due to the lack of feasible routes and available right-of-way through the City of Clearwater.

Mississippi River Crossings 1 through 4 depicted on Figure 3.3.2-1 are situated just south and west of the Sherco Substation. While these locations do not have existing

transmission line crossings, they were favorable due to Xcel Energy ownership of land on both sides of the river and provided the shortest distance to getting across the river. However, the land south and west of the River Crossings 1 through 4 is a residential area with limited availability for a 150-foot right-of-way, including congested development along I-94. Crossing number 6 also does not have existing infrastructure at the crossing but was identified due to its location adjacent to undeveloped land and its narrow river channel location. Crossing Number 5 is the only viable opportunity to cross the river where existing transmission occurs.

The MNDNR commented in a July 10, 2023 letter that "The DNR strongly prefers a route that utilizes existing crossings over the Mississippi River, especially within a wild and scenic river (WSR) district."

Therefore, the Applicant is proposing two route options for the following reasons:

- MNDNR guidance related to state Wild and Scenic Rivers to cross the river where existing transmission line crossing occur;
- Residential impacts of routes west and south of the Sherco Plant; and
- Engineering challenges and lack of available right-of-way along Interstate 94 for Crossings 1 through 4.

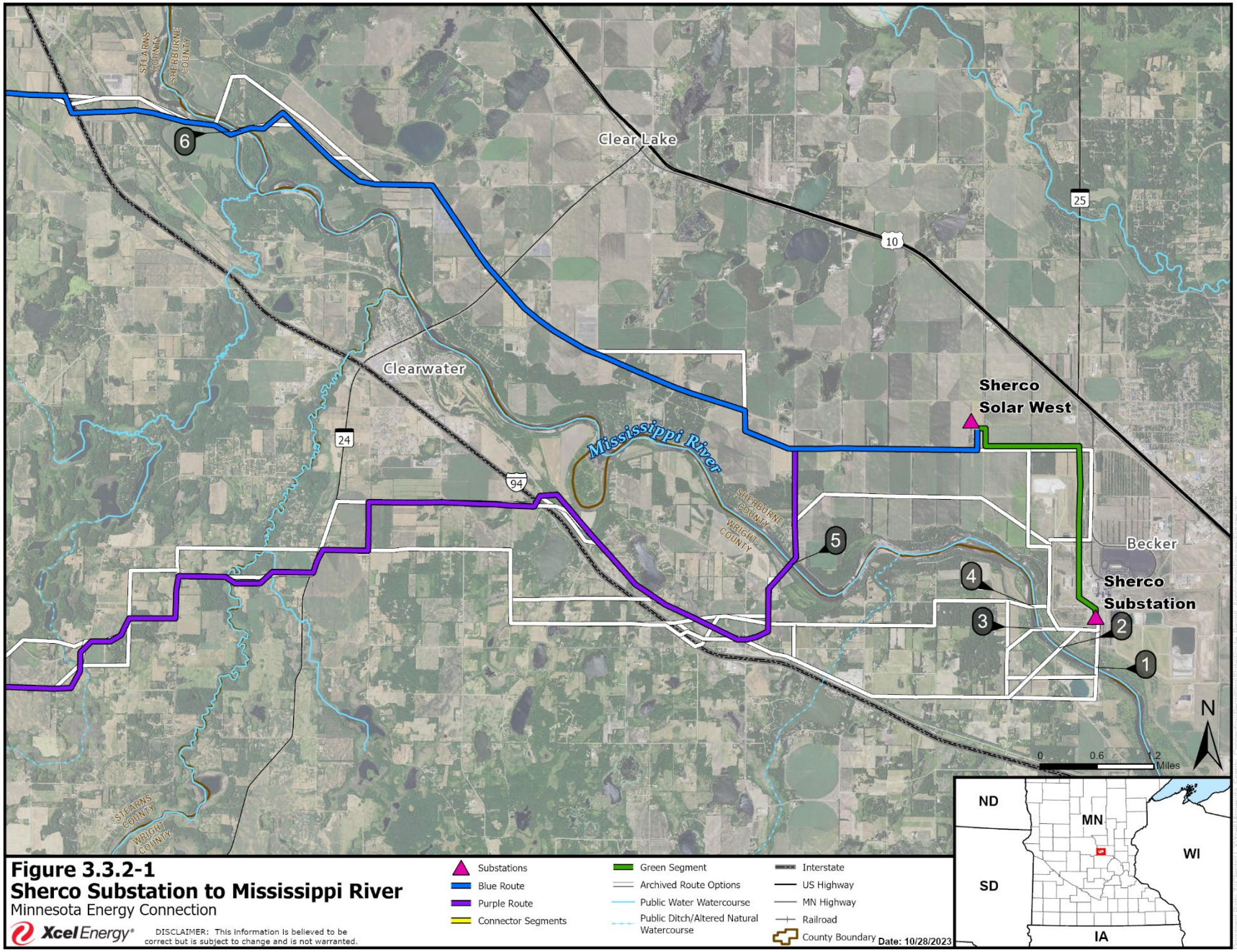


Figure 3.3.2-1
Sherco Substation to Mississippi River
Minnesota Energy Connection

Mississippi River to North Fork of the Crow River

Two route corridors were developed from the Mississippi River to the North Fork of the Crow River with a common segment in the middle. The Applicant has identified this area (roughly 15 miles southwest of the Mississippi River) as the most constrained routing in the Routing Study Area. Figure 3.3.2-2 depicts the Purple and Blue Route options, as well as the various segment alternatives analyzed. The Applicant attempted to locate other route segment options, but the presence of large lakes, residential development, and irrigated agricultural land limited the available route options in this area. The route option that follows State Highway 15 south of Kimball was eliminated from consideration and is discussed in the following section.

North Fork of the Crow River to the Minnesota River

The North Fork of the Crow River is a Minnesota Wild and Scenic River designated as recreational. Three crossings of the North Fork of the Crow River were considered as shown on Figure 3.3.2-3. These three options cross the North Fork of the Crow River in Meeker County, and all are also designated as a State Water Trail. A water trail is a section of a lake or river mapped and managed especially for canoeing. The western two crossing options remain as a part of the Purple and Blue Routes, the easternmost option was eliminated as it was a part of the State Highway 15 option which was eliminated.

From the North Fork of the Crow River, heading south, the route options evaluated generally followed three corridors. On the west, routes generally followed field divisions and various county roads, the middle corridor follows State Highway 4, and the easternmost option generally follows State Highway 15.

As these corridors were developed and subject to comparison, the Applicant discovered that the intended purpose of the eastern route, which was to follow State Highway 15, could not actually follow the highway due to the densely populated nature of the area, increased residential impacts, and other landscape constraints that limited available right-of-way for a new transmission line, and was therefore eliminated from consideration.

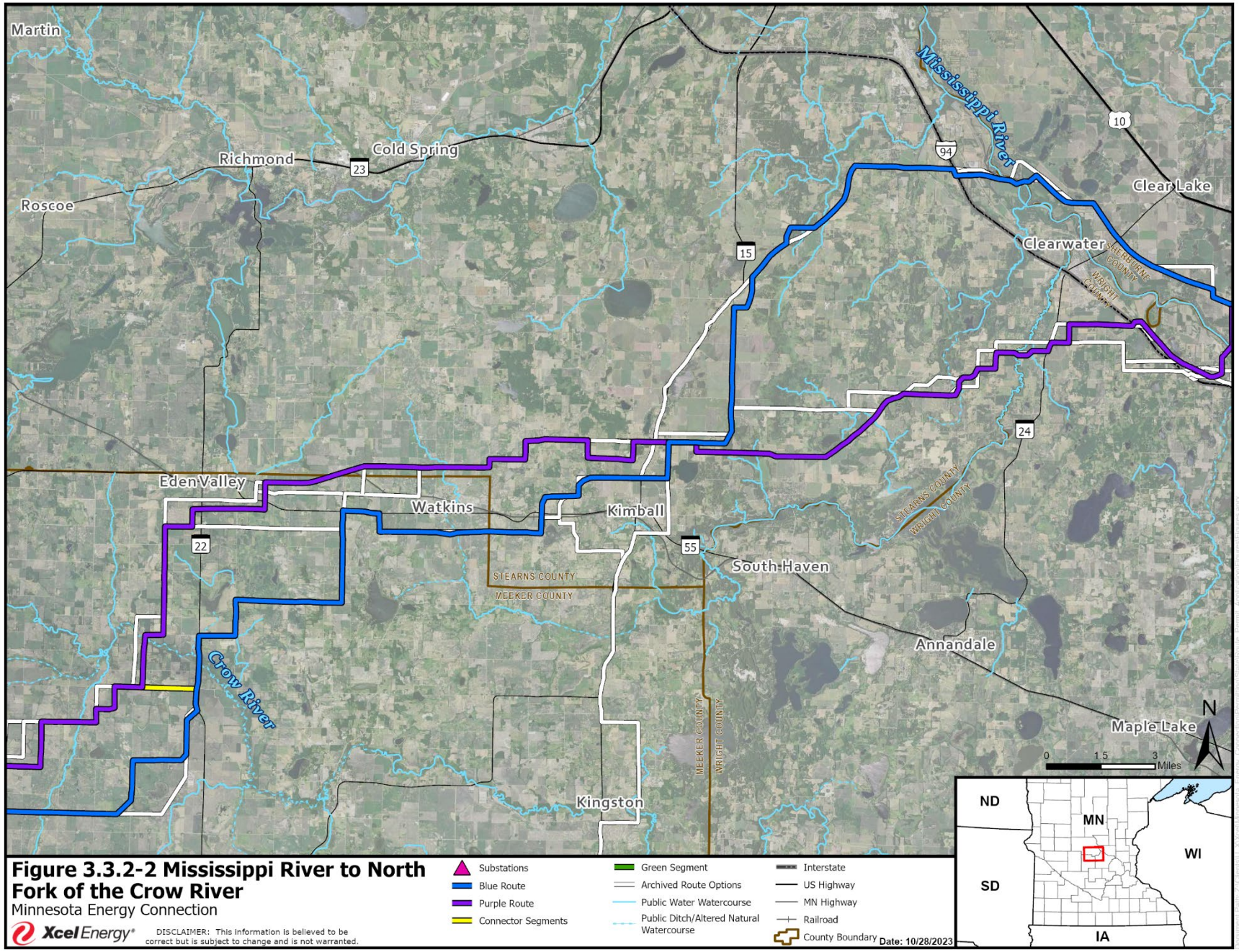


Figure 3.3.2-2 Mississippi River to North Fork of the Crow River
Minnesota Energy Connection

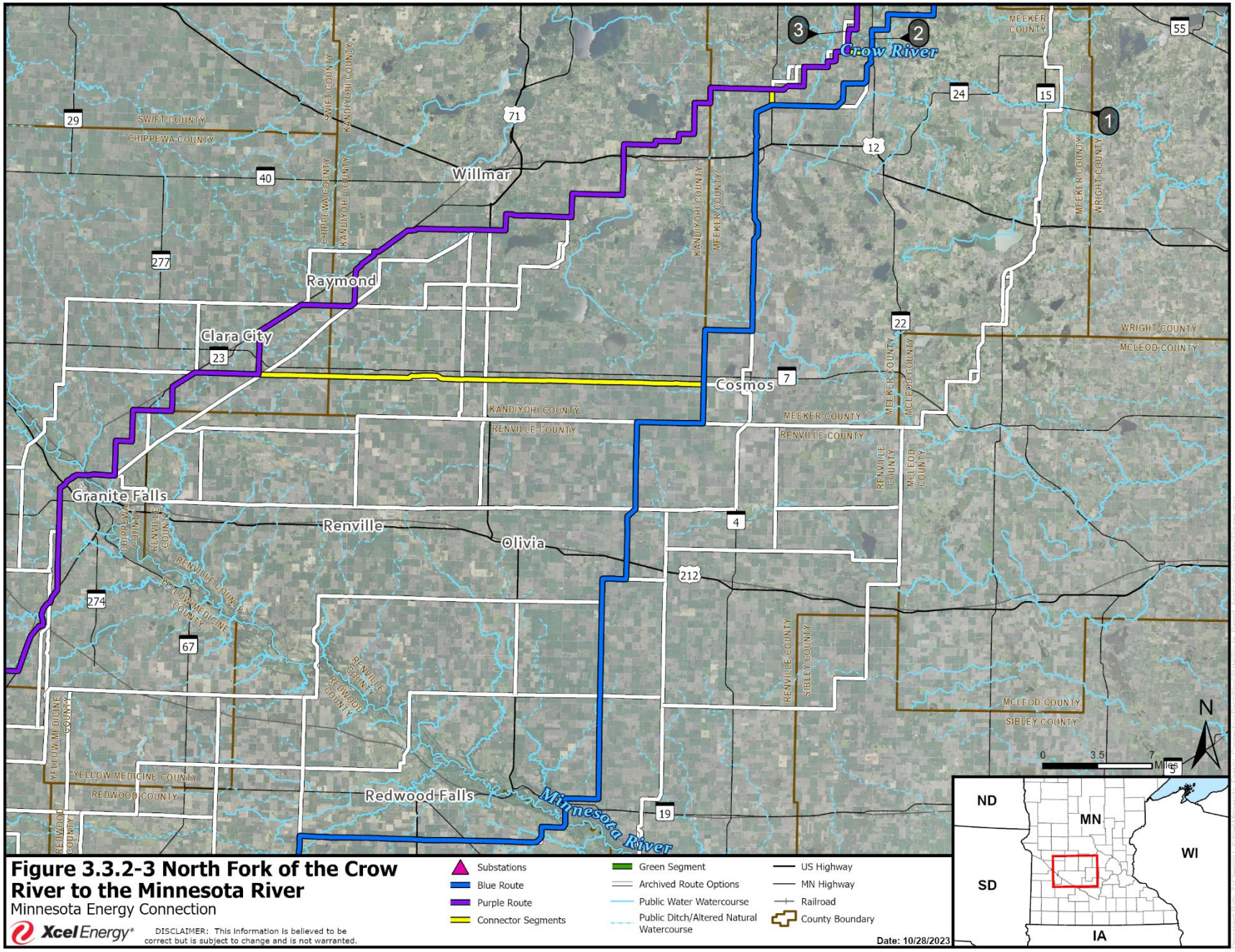


Figure 3.3.2-3 North Fork of the Crow River to the Minnesota River
Minnesota Energy Connection

Minnesota River to the Terminal Substation

Six potential Minnesota River crossing options were studied as shown on Figure 3.3.2-4. For each crossing, the Applicant inventoried known natural resource features, constructability concerns, and conservation easements. Using comparison data described above in Section 3.2.2 to analyze each crossing option which includes considering routes leading to each crossing, the Applicant made the following decisions:

- Removal of Crossing Number 1
    - An existing 345 kV transmission line and terrain challenges presents significant constructability concerns and limited availability for a new adjacent right-of-way.
    - The routes leading to this location are longer than others.
- Removal of Crossing Number 3
    - No existing infrastructure at crossing location.
    - Impact on natural resources (i.e., SOBS and NPCs).
- Removal of Crossing Number 4
    - No existing infrastructure at crossing location.
    - Increased impact on natural resources (i.e., SOBS and NPCs), and proximity to calcareous fen.
- Removal of Crossing Number 6
    - No existing infrastructure at crossing location.
    - Challenging terrain leading to constructability concerns.
    - Impact to residences.
    - Impact on natural resources (i.e., NPC).

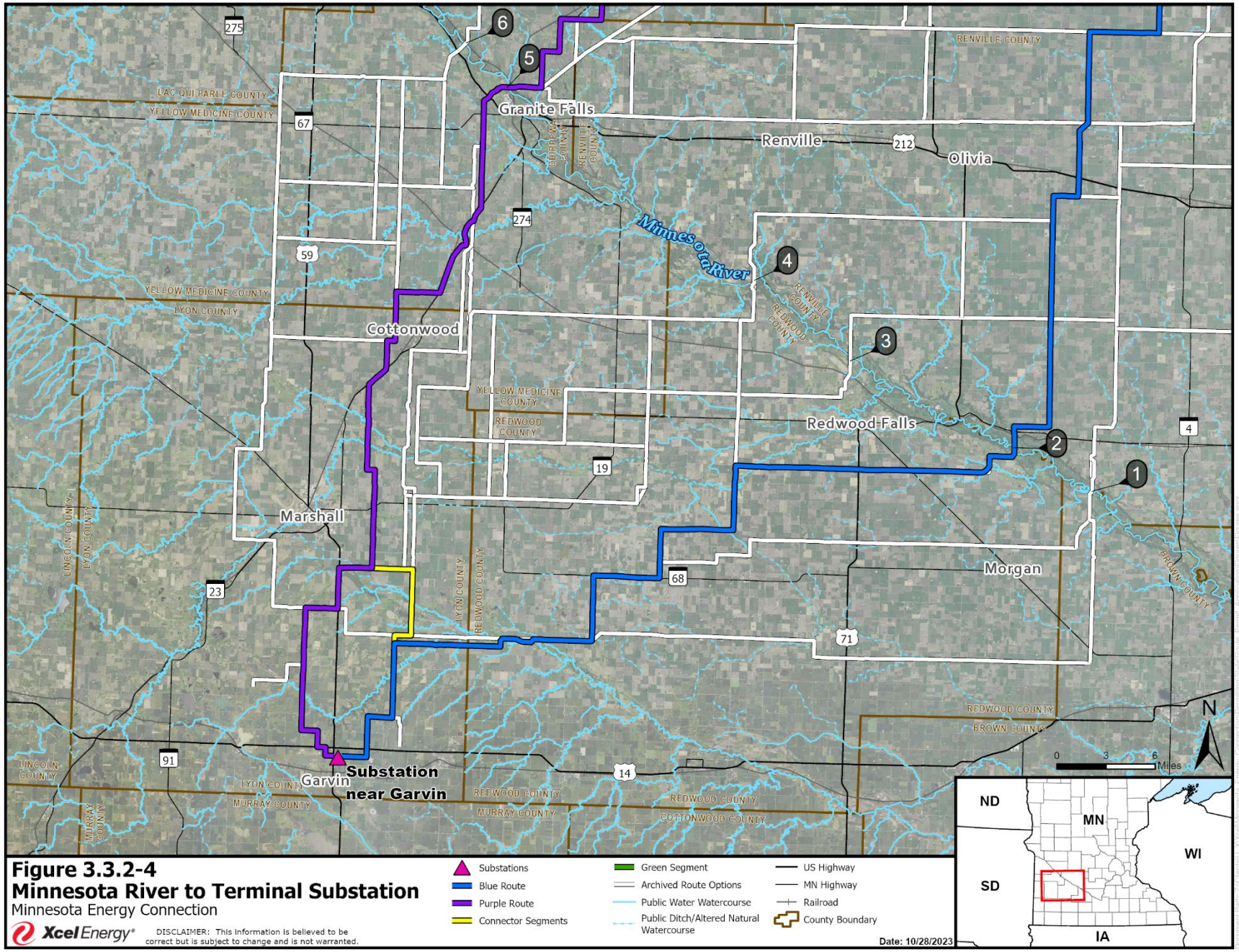


Figure 3.3.2-4
Minnesota River to Terminal Substation
Minnesota Energy Connection

The Applicant also developed routes from each of the six Minnesota River crossing locations. The easternmost routes were removed from consideration because they were dependent upon Minnesota River crossing number 1, which was rejected from further consideration. The westernmost crossings, including the segment west of Marshall were removed after it was determined that any combination of these routes had greater impact primarily on agricultural land and residences than those east of the City of Marshall.

Overall, the Purple and Blue Routes were finalized by comparing all route segment options and combining the least impactful route segments into complete routes. Those are the routes reflected in this Application.

3.3.2 Comparison of Segments and Routes

The Applicant reviewed the route combinations using route evaluation criteria for each of these segments. The routing criteria included length, engineering feasibility, and numbers of selected resources or features such as residences or natural resource crossings.

The route screening analysis was used to identify a smaller set of routes upon which to focus the selection process. Additionally, opportunities were identified to connect between these routes to create flexibility in configuring combinations of routes if desired (refer to Section 4.5).

First Round of Comparative Analysis (April/May 2023)

- A wide network of route segments was developed and presented at the first round of public open houses in February 2023 (refer to Figure 3.2.5-1). After the public comment period ended, the Applicant reviewed the comments and removed segments from consideration, including the easternmost routes along Highway 15 due to materially higher residential impacts.
- Two Minnesota River crossings due to engineering challenges and more significant natural resource impacts.
- The endpoint substation siting area based on analysis of available and suitable land for placing a substation.

Second Round of Comparative Analysis (July 2023)

The Applicant presented a refined routing network during the second round of public open houses in June 2023 (refer to Figure 3.2.5-2). Similar to the first round of public meetings, the Applicant considered public and agency input received during the comment period and responded by modifying route segments where warranted, adding

several new route segments, and then subjected the route network to another round of comparative analysis.

The goal of this second round of analysis was to remove most if not all redundant segments and connect the remaining segments into two or more end to end routes. In addition to the removal of higher impact, redundant segments, the Applicant removed from further consideration:

- two additional Minnesota River crossings due to higher impacts to natural resources and correspondence from the MNDNR to focus crossings at locations where existing infrastructure occurs;
- easternmost routes northeast and east of Marshall due to more significant residential and farmland impacts; and
- Mississippi River crossings south of the Sherco Substation due to lack of existing infrastructure at the crossing, impacts to residential areas south of the river, and lack of space for a new transmission line right-of-way along I-94.

Purple and Blue Routes

Based on this analysis, two routes, along with four connector segments (refer to Section 4.5), were selected for further analysis and inclusion in this Application. The Purple and Blue Routes were analyzed according to Minnesota routing criteria and are depicted in Figure 1.0-1. The two routes are discussed in further detail in Section 4.0 of this Application.

4.0 DESCRIPTION OF PROPOSED ROUTES

The sections below provide a brief description of the proposed routes and Figure 4.0-1 depicts the proposed routes. Detailed route maps are provided in Appendix C.

The two routes proposed in this Application share a common segment (the Green Segment) between the Sherco Substation in Becker and the Sherco Solar West Substation. After leaving the Sherco Solar West Substation, both routes travel south/southwest, ending at the proposed Terminal Substation, just north of the Town of Garvin in Lyon County, Minnesota. Between those two endpoints, the proposed routes are very similar in length though the Blue Route is about three miles longer than the Purple Route. The potential impacts from each route option on human settlement and natural resources are described in Section 6.0.

4.1 GREEN SEGMENT

In addition to the Purple and Blue Routes, the Green Segment serves as the interconnection from the Sherco Substation to the Sherco Solar West Substation. The Green Segment will not require additional right-of-way, but adds a second circuit to the Applicant's existing Line 5651 gen-tie line between the Sherco Solar West Substation and the Sherco Substation.

The Green Segment begins at the Sherco Substation and travels north/northwest out of the substation, generally paralleling 125th Avenue toward County Road 8. The Green Segment then crosses County Road 8, then turns west paralleling the county road toward County Road 53. At County Road 53, the Green Segment travels north along the east side of the county road for a short stretch, crosses to the west side of the county road, and enters the Sherco Solar West Substation.

The Green Segment will serve as an interconnection between the Sherco Substation and the Sherco Solar West Substation; as such it will be common to both the Purple and Blue Routes.

4.2 PURPLE ROUTE

Starting from the Sherco Solar West Substation in Sherburne County, the Purple Route parallels the south side of River Road Southeast for about two miles. At 95th Avenue SE, the Purple Route turns south, traveling along the east side of the road for about 1.2 miles toward the Mississippi River, crossing the Mississippi River and 156th Street NW into Wright County. In Wright County, the Purple Route travels northwest paralleling County Road 75 NW past Rice Lake and crossing Fish Creek. About 0.5 mile after crossing Fish Creek, the Purple Route turns west/southwest and crosses County Road 75, Xcel Energy's Monticello-Quarry-Alexandria-Bison 345 kV line, and Interstate 94.

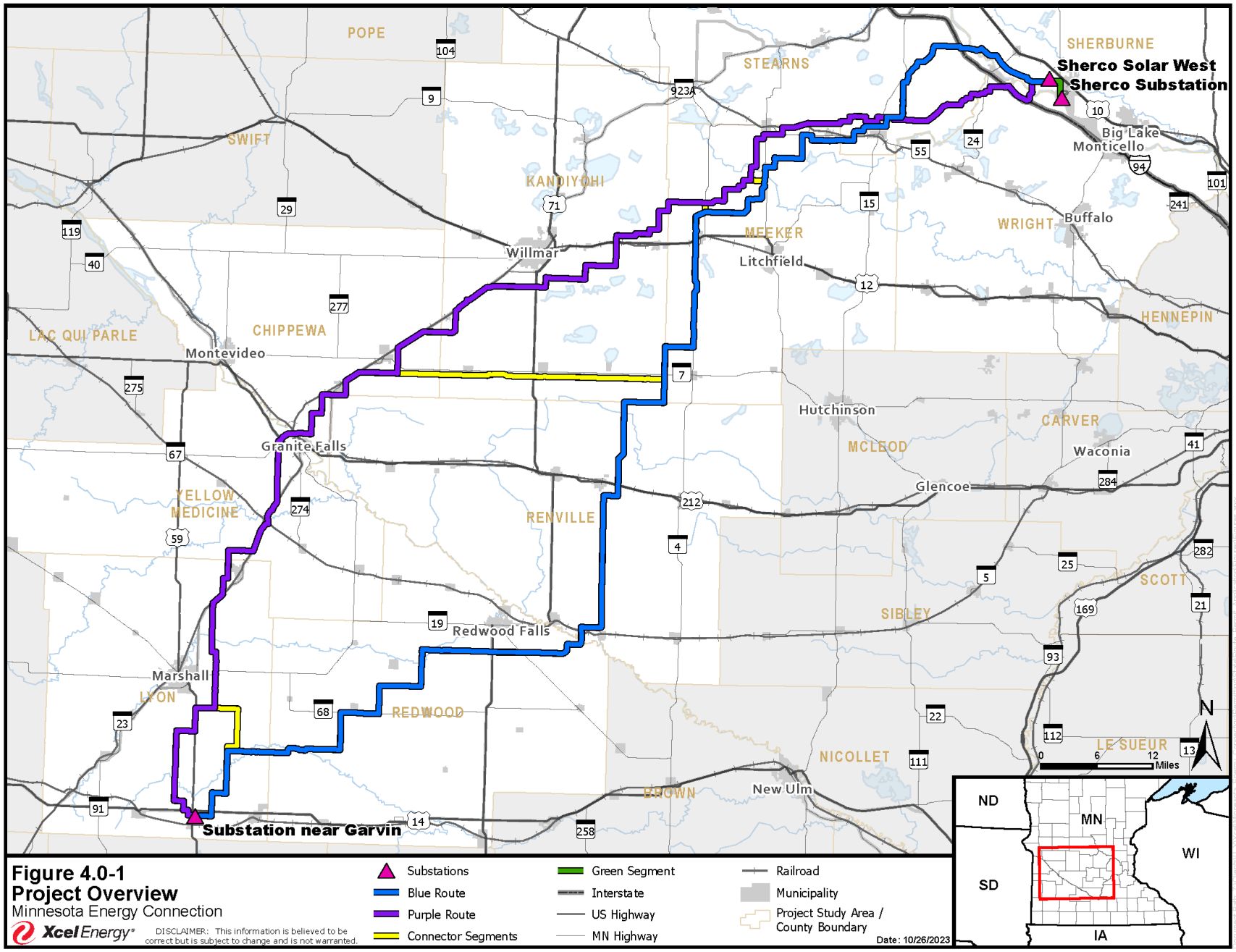
After crossing the interstate, the Purple Route continues to travel through Wright County in a west/south/west pattern paralleling existing roadways before it crosses the Clearwater River into Stearns County about a mile west of State Highway 24 NW. In Stearns County, the route continues to travel in a westerly/southwesterly direction eventually converging with the Blue Route about 0.25 mile west of the intersection of 150th Street and 73rd Avenue. The Purple and Blue Routes share the same path traveling west along the north side of 150th Street for about 0.75 mile. At this point, the Purple Route diverges from the Blue Route and continues to travel west eventually crossing State Highway 15, then crossing into Meeker County.

The Purple Route continues traveling generally west/southwest through Meeker County for approximately 22 miles, before crossing 210 Street SE into Kandiyohi County. The Purple Route continues traveling generally west/southwest through Kandiyohi County for about 33 miles, paralleling public roadways and avoiding municipalities such as Atwater, Kandiyohi, Wilmar, and Raymond. The Purple Route then crosses into Chippewa County about 1.2 miles south of the Town of Raymond and continues to travel generally west/southwest for about 17 miles, paralleling State Highway 23 SE for much of its path except where the route extends south to avoid the towns of Clara City and Maynard.

South of the Town of Maynard in southern Chippewa County, the Purple Route travels west along the Chippewa and Renville County lines, then turns southwesterly and crosses Xcel Energy's Minnesota Valley-Clara City 69 kV line and Minnesota Valley-Maynard-Transmission-Willmar 115 kV line, then begins to travel west before the City of Granite Falls and traveling toward the Minnesota River.

Before reaching the Minnesota River north of Granite Falls, the Purple Route begins to parallel Xcel Energy's Minnesota Valley-Granite Falls 115 kV line and crosses Palmer Creek Road, two Twin Cities and Western railroads, and the Burlington Northern – Santa Fe railroad, all of which generally parallel the Minnesota River in this location. The route then crosses the Minnesota River and the Chippewa and Yellow Medicine County lines, parallel to the existing crossing of the Minnesota Valley-Granite Falls 115 kV line.

After crossing the Minnesota River, the Purple Route diverges from the existing 115 kV line and travels generally south through Yellow Medicine County. Immediately after crossing the Yellow Medicine River, the route bumps out to the southeast to avoid the Town of Hanley Falls; however, the route width clips the southeastern corner of the municipal boundary. About 7 miles after Hanley Falls the route crosses into Lyon County and continues traveling generally south for about 35 miles, past the Town of Cottonwood and the City of Marshall before terminating at the proposed Terminal Substation north of Garvin.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Granite Falls
YELLOW MEDICINE
RENVILLE
Glencoe
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Redwood Falls
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LYON
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NICOLLET
LE SUEUR
BROWN
New Ulm
Substation near Garvin
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Figure 4.0-1
Project Overview
Minnesota Energy Connection
Xcel Energy
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Blue Route
Purple Route
Connector Segments
Green Segment
Interstate
US Highway
MN Highway
Railroad
Municipality
Project Study Area / County Boundary
Date: 10/26/2023

4.3 BLUE ROUTE

Starting from the Sherco Solar West Substation in Sherburne County, the Blue Route follows the same path as the Purple Route until 95th Avenue SE, where the Purple Route turns to the south while the Blue Route diverges from the Purple Route and continues traveling northwest through Clearwater Township paralleling River Road Southeast for much of its length. About 4 miles west of the Town of Clear Lake, the Blue Route crosses the Mississippi River into Stearns County.

A short distance after the river crossing, and just south of the municipal boundary of Saint Augusta, the Blue Route crosses County Road 75, Xcel Energy's Monticello-Quarry-Alexandria-Bison 345 kV line, and Interstate 94. Shortly after crossing the interstate, the route travels west/southwest through the southern portion of the Saint Augusta municipal boundary before turning south and converging with the Purple Route about 0.25 mile west of the intersection of 150th Street and 73rd Avenue. The Purple and Blue Routes share the same path traveling west along the north side of 150th Street for about 0.75 mile. At this point, the Blue Route diverges from the Purple Route and travels south toward the Town of Kimball, then west toward the Meeker County line.

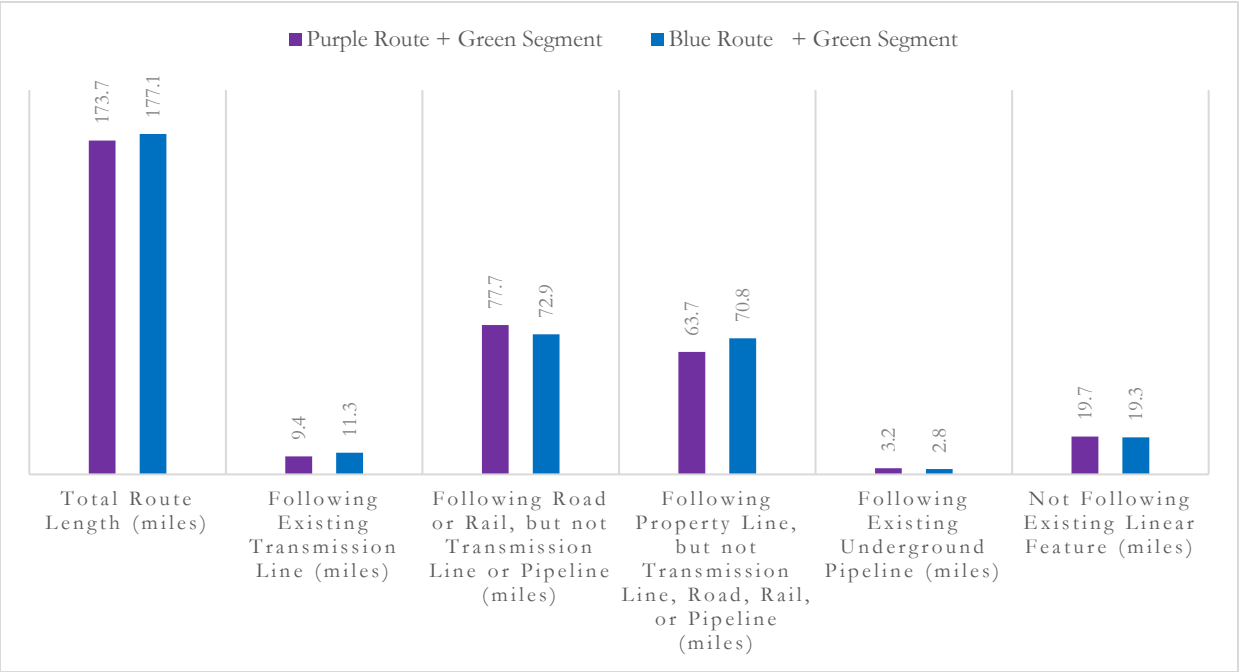
After crossing into Meeker County, the Blue Route continues to travel in a west/southwest direction between the towns of Watkins and Grove City, before turning to the south toward the Town of Cosmos. About 2.5 miles north of Cosmos, the Blue Route turns west then south, traveling along the Meeker and Kandiyohi County lines. At the Renville County line, the route turns west again and travels along the Renville and Kandiyohi County lines for about 4 miles, then turns south into Renville County and continues in a southerly direction for about 26 miles toward the Town of Franklin, just north of the Minnesota River.

When it reaches Franklin, the Blue Route turns west paralleling the northernmost municipal boundary of Franklin, then south to cross the Minnesota River into Redwood County. Where the Blue Route crosses the Minnesota River, it is parallel to an existing 69 kV transmission line. After the river crossing, the Blue Route begins to travel west through Redwood County toward the Redwood River. The Blue Route crosses the Redwood River in two locations; after the first crossing, the route turns south, crosses the river again, then continues traveling south and west in a stepwise fashion toward Lyon County for about 26 miles. After crossing the Lyon County line, the Blue Route travels west for about 4.5 miles, then begins to travel south and west for about 10 miles before terminating at the proposed Terminal Substation north of Garvin.

4.4 ROUTING FOLLOWING LINEAR FEATURES

The Applicant attempted to identify route options that parallel existing linear infrastructure, including roads, railroads, other transmission lines, and property lines to the extent practicable. Refer to Figure 4.4-1 for a breakdown of the types of linear features the route options follow.

Figure 4.4-1 Linear Features Followed by the Route Options



The Purple Route plus the Green Segment is approximately 174 miles long. It follows 9.4 miles of existing transmission lines and 78.0 miles of road or railroad of which 12.6 miles has existing transmission line on the opposite side of the road or rail. The Purple Route shares approximately 154.3 miles, or 89 percent of its total length, with existing linear features, including roads, railroads, and other transmission lines.

The Blue Route plus the Green Segment is approximately 178 miles long. It follows 11.3 miles of existing transmission lines and 76.0 miles of road or railroad of which 7.3 miles has existing transmission line on the opposite side of the road or rail. The Blue Route shares approximately 158.1 miles, or 89 percent of its total length, with existing linear features, including roads, railroads, and other transmission lines.

The Purple and Blue Routes each have approximately 11 percent that do not follow existing linear features. This is primarily due to the avoidance of other constraints such as residential areas, protected areas such as WMAs, WPAs, and state conservation

easements (CREP/RIM), and constructability issues such as crossing areas of existing infrastructure that are already congested.

4.5 CONNECTOR SEGMENTS

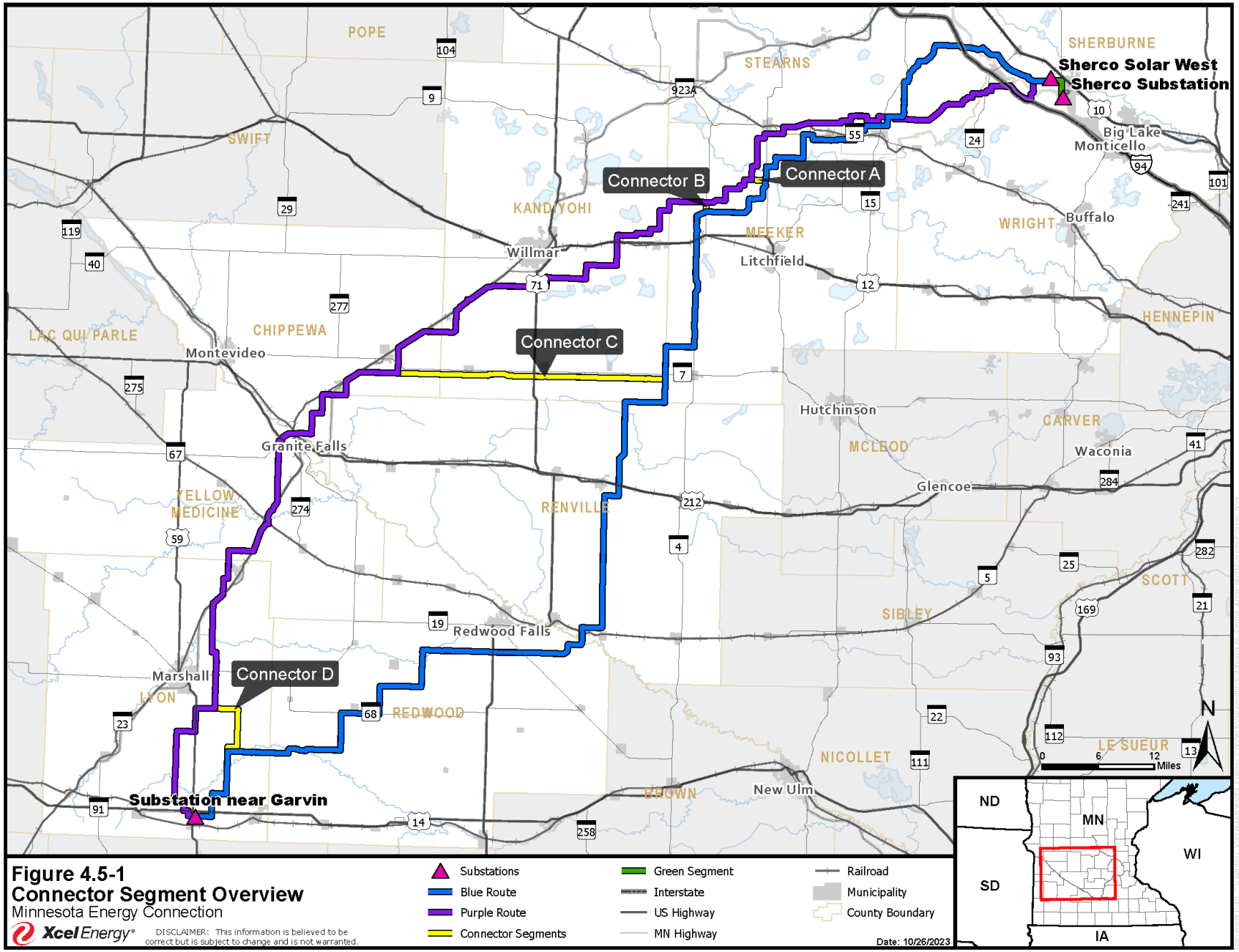
In addition to the routes described above, the Applicant identified four connector segments, A, B, C, and D, that would provide the Commission with options for shifting from one proposed route to the other. A description of each connector segment is presented below. Figure 4.5-1 provides an overview of the connector segments in relation to the two proposed route options.

4.5.1 Connector A

The Applicant identified an approximately 1.5-miles-long connector segment in Meeker County, referred to as Connector Segment A. Connector Segment A begins about 0.5 mile after the Purple Route crosses County Road 3. The connector segment travels east, crossing over 600th Avenue, and continuing east for about 0.7 mile before joining the Blue Route on the east side of State Highway 22, approximately 0.1 mile south of 340th Street.

4.5.2 Connector B

The Applicant identified an approximately 1-mile-long connector segment in Meeker County, referred to as Connector Segment B. Connector Segment B begins just after the Purple Route crosses State Highway 4 about 0.5 mile south of the intersection of the state highway and County Road 16. The connector segment continues south along the west side of State Highway 4 for one mile before joining the Blue Route where it crosses State Highway 4.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Connector B
Connector A
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Litchfield
LAC QUI PARLE
CHIPPEWA
Montevideo
Connector C
HENNEPIN
Hutchinson
CARVER
MCLEOD
Waconia
Granite Falls
YELLOW MEDICINE
RENVILLE
Glencoe
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SIBLEY
Redwood Falls
Marshall
Connector D
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Figure 4.5-1
Connector Segment Overview
Minnesota Energy Connection
Xcel Energy
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Blue Route
Purple Route
Connector Segments
Green Segment
Interstate
US Highway
MN Highway
Railroad
Municipality
County Boundary
Date: 10/26/2023

4.5.3 Connector C

The Applicant identified an approximately 29-mile-long connector segment in Kandiyohi and Chippewa counties, referred to as Connector Segment C. Connector Segment C begins about 1 mile south of where the Purple Route crosses State Highway 7 in Chippewa County. The connector segment turns to the east and the Purple Route turns to the west at this location. Connector Segment C continues east for approximately 29 miles, crossing into Kandiyohi County after about 4.5 miles, traveling south of the Towns of Prinsburg, Roseland, Blomkest, and Lake Lillian. Connector Segment C would cross the southern municipal boundary of Prinsburg. The connector segment crosses the South Fork of the Crow River and travels along the southern boundary of the Dalton Johnson WMA before joining the Blue Route at the Meeker and Kandiyohi County line about 0.5 mile south of State Highway 7 (195th Avenue) and 1 mile east of County Road 2 (195th Street SE).

4.5.4 Connector D

The Applicant identified an approximately 8-mile-long connector segment in Lyon County, referred to as Connector Segment D. The connector segment begins at the intersection of 240th Street and 290th Avenue where the Purple Route turns to the west. The connector segment travels along the north side of 240th Street for about 2.5 miles, crossing over County Road 9 (300th Avenue) and 310th Avenue, then turns south for about 4 miles crossing over 230th Street, Meadow Creek, two unnamed tributaries, 210th Street, and two additional unnamed tributaries. The connector segment crosses 200th Street, then turns west traveling along the south side of the road for 1 mile, then turns south for 0.5 mile, crossing two unnamed tributaries before joining the Blue Route about 0.7 mile southeast of the intersection of 200th Street and 300th Avenue.

5.0 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

The Applicant developed right-of-way acquisition, construction, restoration, and maintenance procedures for the Project. Although certain procedures will be site-specific based upon the final route design, general procedures are discussed in some detail in this Application.

5.1 RIGHT-OF-WAY ACQUISITION

The Applicant will obtain easements, rights-of-way, and the other land rights necessary to construct, operate, and maintain the facilities. The rights will consist primarily of permanent electric transmission easements, typically providing a 150-feet-wide easement area. In addition, there will be ancillary rights, including access (temporary and permanent) and construction workspace, as necessary to support construction and ongoing operation and maintenance.

The work of identifying and acquiring the necessary rights begins early in the detailed design process. The early evaluation and acquisition activities include preliminary issues, such as title examination, initial owner contacts, and survey work. Further steps in the process involve preparing land rights agreements (options, access permissions, and/or easements) and working with landowners to agree upon and execute those agreements.

Applicant and its agent will identify the owners of lands from which rights are needed and will then engage will the individual owners, or their representative, about the project, the specific rights that are to be acquired, and other issues related to the Project's design, construction, operation, or maintenance. These initial contacts with landowners may also involve requests from Applicant or its agent to enter the owner's property in order to conduct survey activities beneficial to the design, routing, and/or permitting processes. Access for survey purposes is typically obtained, followed by the necessary environmental, civil, geotechnical and other survey activities. Another common activity during this period is the staking of the proposed location of facility components and/or easement boundaries.

Where new rights-of-way are being acquired, Applicant and its agents will work with owners to address their questions in the routing and/or acquisition process and help owners prepare for and understand the activities that will take place throughout the facilities' use. Likewise, where Applicant is able to use existing rights-of-way, in whole or in part, Applicant and its agents will work with owners to address issues about the impacts of construction, the interplay of existing rights with the Project facilities, land restoration, and other issues those owners may raise.

Regardless of whether new rights-of-way are being acquired or if existing rights-of-way are being used, Applicant and its agents will ensure that owners' issues are considered and addressed. Common issues include coordinating the interplay of livestock to construction activities through the construction and/or relocation (temporary or permanent) of fencing as well as coordinating planting and harvesting activities, including the payment of crop damages.

With respect to compensation for land rights being acquired for the Project, Applicant and its agents collect market data in order to understand the fair market value of the properties from which rights are being acquired. In addition, Applicant and its agents rely upon independent, professional advice with respect to the anticipated market value impact that the rights Applicant is acquiring will have on the underlying land values. These factors go into Applicant's development and implementation of a compensation plan that is designed to ensure that owners are fairly compensated for the rights being granted to the Applicants.

In most cases, Applicant and owners reach voluntary easement (or other) agreements. Sometimes, however, despite good faith efforts at resolution, Applicant and owners are unable to reach a voluntary agreement. In those circumstances, Applicant may avail itself of the right of eminent domain provided in Minnesota law through condemnation proceedings.

Condemnation actions are generally governed by Minnesota Statutes Chapter 117. Chapter 117 provides certain pre-condemnation requirements imposed on Applicant including but not limited to providing an owner with an appraisal and informing owners of their rights to obtain an appraisal and related rights of reimbursement. The Applicant commences condemnation proceedings under Chapter 117 through the filing of a petition with the district court in which the property is located. Owners of interests in the lands identified in the petition are provided with service of the Applicant's filings and notice of the hearings that the district court will conduct to determine whether to grant the petition and other relief sought by Applicant.

If the court grants the petition, the court then appoints a three-person condemnation commission—knowledgeable in real estate issues—that will determine in the first instance the amount of just compensation Applicant is required to pay for its acquisition of rights in the action. There is a well-developed body of law in Minnesota for determining valuation of the acquisition of easement rights. For each acquisition in a condemnation proceeding, the commissioners conduct a statutorily required viewing and then a hearing at which the owners and the Applicant, and their respective witnesses, can present their case as to the appropriate amount the commissioners should award as just compensation. After that hearing and any further deliberation by the commissioners, the panel issues an award reciting the amount to be paid to the

owners for the acquisition. The award is filed with the district court. The parties have rights to appeal from those awards to the district court for a jury trial de novo. If an appeal is taken, the district court determines a schedule for the action and ultimately, the case may be tried to a jury that will issue its verdict on just compensation. At any point in this process, the case can be dismissed if the parties reach a settlement.

Because the Project involves transmission lines greater than 200 kV, Minnesota law provides that qualifying owners may elect to have certain of the owner's lands acquired by the Applicant in fee as opposed to the easement sought by the Applicant. The law, known as the "Buy-the-Farm Statute" is in Minn. Stat. § 216E.12, subd. 4, and it provides certain procedures specific to the making of an election by an owner, deadlines for the Applicant to either accept or object to such an election, and a process and timeless for the district court to decide whether an election is valid or not when it is disputed. The measure of compensation for acquisition of an owner's fee interest is different than for acquisition of easements, but the process of reaching those valuation determinations—by the Commission and then by a jury or judge in the event of an appeal—are substantively the same as the easement acquisition process described above. In addition, owners who make Buy-the-Farm elections that are accepted as valid by Applicants or ruled valid by the district court may receive other rights or benefits applicable under Minn. Stat. Ch. 117.

5.2 CONSTRUCTION PROCEDURES

Construction will begin after necessary federal, state, and local approvals are obtained and property and rights-of-way are acquired for that segment. Construction in areas where approvals are not needed or have already been obtained may proceed while approvals for other areas are in process. The precise timing of construction will take into account various requirements of permit conditions, environmental restrictions, availability of outages for existing transmission lines (if required), available workforce, and materials.

Construction will follow Xcel Energy's standard construction and mitigation best practices as developed to minimize temporary and permanent impacts to land and the environment. Construction typically progresses as follows:

- survey marking of the right-of-way;
- right-of-way clearing and access preparation;
- grading or filling if necessary;
- installation of concrete foundations;
- installation of poles, insulators, and hardware;

- conductor stringing;
- installation of any aerial markers required by state or federal permits; and
- site restoration.

5.2.1 Survey Marking of the Right-of-Way

Prior to the arrival of construction crews, surveyors will stake the limits of disturbance for the construction corridor. The limits of disturbance will encompass the right-of-way and pole locations along the approved alignment of the transmission line. The construction contractor will also request utility locates prior to the start of right-of-way clearing.

The Gopher State One-Call system will be used to locate and mark all existing underground utilities prior to the start of right-of-way clearing to avoid impacts on existing utilities. If crossing an underground utility is required, Xcel Energy will protect existing infrastructure while using heavy equipment during construction, such as construction matting, and will coordinate with the utility owner.

5.2.2 Right-of-Way and Access Preparation

Construction crews will begin preparing the right-of-way by clearing vegetation to ensure that vegetation complies with NESC standards (i.e., trees and other tall-growing vegetation will be removed), and the construction crew will have safe access to the construction site that is free of debris.

Xcel Energy will design the transmission line structures for installations at the existing grades. Where a site slope requires (typically on slopes exceeding 10 percent), working areas may be graded or leveled with fill to create a safe working area. If acceptable to the landowner, Xcel Energy proposes to leave the graded/leveled areas after construction to allow access for future maintenance activities. If not acceptable to the landowner, Xcel Energy will, to the best of its ability, return the grade of the site back to its original condition.

Construction will require the use of many different types of construction equipment including tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, drill rigs, dump trucks, front-end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, helicopters, and various trailers or other hauling equipment. Excavation equipment is often set on wheeled or track-driven vehicles. Construction crews will attempt to use equipment, when opportunities are available, that minimize impacts to lands.

Construction staging areas/laydown yards are usually established for transmission projects. For the Project, Xcel Energy may establish new staging areas/laydown yards and/or may use existing staging areas/laydown yards. Staging areas/laydown yards are typically 20 to 30 acres in size and located near major roads. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. Construction of the Project will likely include two to five existing or new staging areas. Structures are delivered to staging areas and materials are stored until they are needed for the Project.

The Applicant will evaluate construction access opportunities by identifying existing transmission line easements, roads, or trails that run near the approved route. The Applicant will limit construction activities to the easement area. In certain circumstances additional off-easement access may be required. Permission will be obtained from landowners prior to using off-easement access.

Improvements to existing access or construction of new access may be required to accommodate construction equipment. Field approaches and roads may be constructed or improved. Where applicable, the Applicant will obtain permits for new access from local road authorities. The Applicant will also work with appropriate road authorities to ensure proper maintenance of roadways traversed by construction equipment. Xcel Energy will comply with all requirements of its Stormwater Pollution Prevention Plan (SWPPP) and Vegetation Management Plan (VMP) to prevent the spread of invasive species.

5.2.3 Foundation and Pole Installation

After right-of-way clearing and access preparation has been completed, existing facilities will be located and pole and foundation installation will begin. Most structures for the Project will require a drilled pier concrete foundation. Drilled pier foundations, which consist of large diameter concrete cylinders and reinforced steel are typically between seven to ten feet in diameter and are typically 20 to 60 feet deep, depending on soil conditions. An angle or dead-end structure may require a foundation up to 12 feet in diameter. The actual diameter and depth of the hole (and foundation) depend on structure design and soil conditions that are determined during the initial survey and soil testing phases. Concrete may be brought to the site by concrete trucks from a local concrete batch plant and filled around a steel rebar support cage and anchor bolts. Once the foundation is cured, the pole is bolted to the foundation.

Sections of transmission structures will be moved from staging areas and delivered to the foundation and assembled on site. Using a crane, the pole is lifted and placed. Insulators and other hardware are attached.

For the substations, installation of concrete foundations and embedments for equipment will require the use of concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. The limit of disturbance will be within the footprint of the substations for both the foundation equipment and the concrete delivery trucks. All topsoil from the substation footprints will be removed to a pre-established suitable location for storage. The storage area would be near the site where the soil was removed, accurately located (Global Positioning System [GPS] boundary, soil depth) and graded to facilitate revegetation. Subsoil would be removed, if necessary, to an acceptable pre-established and approved area for storage.

Some soil conditions and environmentally sensitive areas will require special techniques. The most effective way to minimize impacts to these areas will be to avoid placing poles in the sensitive areas. The conductor can then span the feature. When it is not feasible to avoid traversing sensitive areas, best management practices (BMPs) such as use of construction matting to avoid equipment rutting, working in frozen ground conditions, and installation of sediment and erosion control devices will be implemented in consultation with the appropriate agencies. Examples of erosion control devices which could be used are silt fence, straw bales, bio logs, and mulch. BMPs are discussed in greater detail throughout Chapter 6.0.

5.2.4 Conductor Stringing

Conductor stringing is the last major component of transmission line construction. Stringing setup areas are typically located at 2- to 3-mile intervals. These sites are located within the right-of-way, when possible, or on temporary construction easements. These operations require brief access to each structure to secure the conductor wire to the insulator hardware and the shield wire to clamps once final conductor sag, compliant with Xcel Energy procedures and minimum code clearances, is established. This access can be conducted by crane or helicopter.

Where the transmission line crosses streets, roads, highways, or other energized conductors or obstructions, temporary guard or clearance poles may be installed before conductor stringing. The temporary guard or clearance poles ensure that conductors will not obstruct traffic or contact existing energized conductors or other cables during stringing operations and also protects the conductors from damage.

The electrical conductors would be strung on support structures using a pulley system or a tensioner mounted on the back of a digger/derrick truck. At road crossings, roads or lands may be temporarily closed for safety purposes when stringing electrical conductors between support structures. These closures could range in duration from minutes to hours based on the width of the road and the complexity of the crossing.

Once an aerial crossing is completed, the road would be reopened to allow normal traffic flow.

5.2.5 Aerial Marker Installation

After conductor installation is complete, conductor marking devices will be installed if required. These marking devices may include bird flight diverters or air navigational markers. The Applicant will work with the appropriate agencies to identify locations where marking devices will be installed.

5.3 RESTORATION AND CLEAN-UP PROCEDURES

Crews will attempt to minimize ground disturbance whenever feasible, but areas will be disturbed during the normal course of work. Once construction is completed in an area, disturbed areas will be restored to their original condition to the maximum extent feasible and in accordance with the VMP. Temporary restoration before the completion of construction in some areas along the right-of-way may be required per National Pollutant Discharge Elimination System (NPDES) and Minnesota Pollution Control Agency (MPCA) construction permit requirements.

After construction activities have been completed, a representative will contact the property owner to discuss any damage that has occurred as a result of the Project. This contact may not occur until after the Applicant has started restoration activities. If fences, drain tile, or other property have been damaged, the Applicant will repair damages or reimburse the landowner to repair the damages.

Farmers will be compensated for crops damaged during construction. The damaged area will be measured, yield determined in consultation with the farmer, and paid at current market rates. Additional avoidance, minimization, and mitigation measures related to agricultural impacts are discussed in Section 6.3.1.

Ground-level vegetation that is disturbed or removed from the right-of-way during construction of the Project will be allowed to naturally reestablish to pre-construction conditions. Vegetation that is consistent with substation site operation outside the fenced area will be allowed to reestablish naturally at substation sites. Areas where significant soil compaction or other disturbance from construction activities occur will require additional assistance in reestablishing the ground-level vegetation and controlling soil erosion. In these areas, the Applicant will use seed that is noxious weed free to reestablish vegetation.

Another aspect of restoration relates to the roads used to access staging areas or construction sites. After construction activities are complete, the Applicant will ensure that township, city, and county roads used for purposes of access during construction

will be restored to their prior condition. The Applicant will coordinate with township road supervisors, city road personnel, or county highway departments to document existing road conditions and address any issues that arise during construction with roadways to ensure the roads are adequately restored, if necessary, after construction is complete.

5.4 MAINTENANCE PROCEDURES

Transmission lines and substations are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation. Xcel Energy will be responsible for the operation and maintenance of this Project. Xcel Energy will perform annual aerial inspections of the 345 kV transmission lines and will inspect the lines from the ground approximately every four years. Typically, one to two workers are required to perform aerial inspections with drones and three workers are required to perform the ground inspections; ground inspections are performed by both driving and walking. Any defects identified during these inspections will be assessed and corrected. Xcel Energy will also perform necessary vegetation management for the line either through mechanical clearing or herbicide use, in accordance with the VMP. Vegetation maintenance generally occurs every four years.

The annual inspections are the principal operating and maintenance cost for transmission facilities. The aerial inspections cost approximately $35 to $55 per mile and the ground inspections cost approximately $200 to $400 per mile. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

Substations require a certain amount of maintenance to keep them functioning in accordance with accepted operating parameters and the NESC requirements. Transformers, circuit breakers, batteries, protective relays, and other equipment need to be serviced periodically in accordance with the manufacturer's recommendations. The substation site must be kept free of vegetation and adequate drainage must be maintained.

The estimated service life of the proposed transmission line for accounting purposes varies among utilities. Xcel Energy use an approximately 60-year service life for its transmission assets. However, practically speaking, high voltage transmission lines are seldom completely retired.

5.4.1 Outages and Emergency Response

Transmission infrastructure has few mechanical elements and is built to withstand weather extremes that are normally encountered. With the exception of outages due to severe weather such as tornadoes and heavy ice storms, transmission lines rarely fail.

Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

However, unplanned outages of transmission facilities can happen for a variety of reasons. Unplanned outages can occur due to mechanical failures or severe weather like heavy ice, wind, and lightning. In the event an unplanned outage of the proposed Project occurs, the Applicant has the necessary infrastructure and crews in place in central and southern Minnesota to respond quickly and safely to return this line to service.

If there is a storm or emergency outage on the lines, Xcel Energy has distribution service centers in the region that will initiate a tactical response by deploying one of its 24-hour on call first responders to the lines as quickly as possible to patrol the line and immediately assess the damage. Once the damage has been assessed the first responder will immediately relay the following information back to the service center:

- magnitude of damage;
- isolation requirements for switching;
- material required for restoration;
- number of line crew needed; and
- equipment needed.

Based on the assessment of the first responder, Xcel Energy will develop a plan to restore the damaged facilities. The goal of the repair is to place the transmission system back into service as quickly as possible to minimize the impact to the transmission system. Xcel Energy has the benefit of both internal and contract crews distributed across central and southern Minnesota and the Twin Cities that will enable a rapid response to outage events on the transmission line. These crews can typically be mobilized and on-site within two hours of an event to begin restoration activities. Xcel Energy also has an experienced in-house Engineering Department that can be called upon to quickly develop an engineering solution to any damaged transmission infrastructure.

Another key element of the emergency and unplanned outage response is having the necessary materials on-hand and nearby to replace or repair damaged facilities as quickly as possible. Xcel Energy maintains nearly 20,000 miles of transmission line and can promptly procure, load, and deliver materials during emergency situations. In the event of an unplanned outage of the line, Xcel Energy's primary transmission material emergency stock is stored at its service center located in Maple Grove, Minnesota that has a critical stock of replacement wires, and hardware. In addition, the Maple Grove service center also has a fleet of tractor trailers and drivers on-call 24 hours a day that can be utilized to ship these replacement materials to the Project area.

Xcel Energy has won multiple industry awards for its storm and emergency response. In June 2016, Xcel Energy received its fourth major storm response award in five years from the Edison Electric Institute. This Emergency Recovery Award recognized Xcel Energy's superior response to a three-day blizzard that damaged utility infrastructure in Xcel Energy's Texas and New Mexico service territories. Xcel Energy also won Emergency Recovery awards in 2013 and 2015 for its response to severe thunderstorms in the Twin Cities and an Assistance Award in 2012 for Xcel Energy's help with the recovery following Superstorm Sandy.

5.4.2 Climate Change and Resiliency

Climate change is the change in global or regional climate patterns over time. Potential indicators of climate change include an alteration of average precipitation or temperature over years or decades. Over the past century, Minnesota's climate has been changing. Noticeable effects include warmer periods during winter and at night, increased precipitation, and heavier downpours. Between the years 1895 and 2020, Minnesota's average temperature has increased by 3.0 °F and annual precipitation has increased by 3.4 inches (MNDNR, 2023a).

As a result of climate change, the Project Study Area could experience an increased risk of flooding, increased temperatures, high winds, and excessive rainfall. Electric transmission equipment can withstand the anticipated increases in temperature, and changes in weather patterns are accounted for in the Project design. More specifically, for example, the Project has been designed to minimize the potential for galloping during high winds by the use of bundled (twisted pair) conductors. Flood risk mitigation is discussed in Section 6.5.4.3.

Further, the Project is proposed to facilitate the increased interconnection of renewable energy resources upon the retirement of the Sherco coal units. In this way, the Project is proposed to avoid or minimize future climate change impacts.

6.0 ENVIRONMENTAL INFORMATION

This section provides a general description of the environmental and human setting of the two route options (the Purple Route and the Blue Route), the Green Segment, and the four connector routes identified by the Applicant. Topics discussed in the following subsections are organized to follow the environmental information requirements under Minn. Rules 7850.1900, subp. 3 including: environmental setting, human settlement, land-based economies, archaeological and historic resources, natural environment, and rare and unique natural resources. In addition to identifying existing resources under these categories, the potential effects of the Project on resources are discussed, and measures that can be used to avoid, minimize, or mitigate effects are presented. A discussion of unavoidable or irretrievable impacts is presented, as well.

The description of the existing environment within the Project Study Area is applicable to the Purple and Blue Routes, the Green Segment, and the four connector routes identified by the Applicant. Where specific, quantified impacts are discussed, the Applicant quantified these based on the Application alignments for each proposed route option, as shown in the detailed routing maps in Appendix C. The Application alignments were identified based on the best data available at the time of this Application. The Applicant anticipates that portions of the Application alignments will be modified either before a Route Permit is issued or based on the final route selected by the Commission and before construction begins to address design, engineering, or stakeholder concerns, including those of agencies and landowners.

The specific location of the new Project substations will be determined through this routing proceeding. To describe and account for the potential impacts of construction of the new Project substations, this Application assumes that each substation will have a footprint of between 20 and 40 acres (refer to Section 2.6). As described further in Section 2.3, potential substation siting areas were identified to avoid impacts to sensitive resources, including wetlands.

Sections 6.1 through 6.7 below describe the environmental setting of the Purple Route and Blue Route, as well as potential impacts and mitigation measures related to each resource discussed. For ease of reference, the Green Segment is discussed separately in Section 6.8, and the Connector Segments are analyzed in Section 6.9.

6.1 DESCRIPTION OF ENVIRONMENTAL SETTING

The Project Study Area includes all or portions of Sherburne, Stearns, Wright, Kandiyohi, Meeker, Chippewa, Renville, Yellow Medicine, Redwood, and Lyon counties as shown on Figure 1.0-1. The landscape within the Project Study Area changes from the northeast to southwest as a result of past glacial activity and other

ecological factors that affected the developing landscape over time. These changes are apparent in the hydrology, vegetation, topography, land use, and human settlement patterns within the Project Study Area.

The northeastern portion of the Project Study Area is characterized by a gently rolling to undulating topography with moraines and outwash plains that were formed by the Des Moines lobe of the late Wisconsin glaciation. The Mississippi River valley cuts through the northeastern tip of the Project Study Area. South of the river valley, lakes and wetlands are abundant. Continuing southwest across the Project Study Area, the landscape transitions to a generally level to slightly undulating landforms that were once tallgrass prairie. Agricultural fields now dominate this portion of the Project Study Area. The Minnesota River valley bisects the Project Study Area running northwest to southeast between the communities of Granite Falls and Redwood Falls. South of the Minnesota River valley, level topography and agricultural fields continue to dominate the southwestern portion of the Project Study Area.

The MNDNR and the U.S. Forest Service developed an Ecological Classification System (ECS) for ecological mapping and landscape classification in Minnesota that is used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features (MNDNR, 2023b). Through the ECS, the State of Minnesota is split into ecological provinces, sections, and subsections. The most northeastern portion of the Project Study Area is in the Minnesota and NE Iowa Morainal Section of the Eastern Broadleaf Forest Province while the remainder of the Project Study Area to the southwest is in the North Central Glaciated Plains Section of the Prairie Parkland Province (Figure 6.1-1).

Minnesota and NE Iowa Morainal Section

The Minnesota and NE Iowa Morainal Section (222M) stretches in a southeasterly direction from Polk County in northwestern Minnesota to the Iowa border in southeastern Minnesota. The landscape in this section ranges from rugged to hummocky moraines deposited along the eastern margin of the Des Moines ice lobe during the last glaciation to rolling till or basal till drumlins (MNDNR, 2023b). Sand plains also are present within this section, the largest of which is the Anoka Sand Plain that is north of the Twin Cities metropolitan area; smaller sand plains also occur locally within the moraines. Pre-settlement vegetation consisted of prairie, savanna, and oak and aspen woodlands in flat, sandy areas and mesic forests of sugar maple, basswood, American elm, and northern red oak in the hummocky morainal areas. Today, many areas have been cleared for population centers (e.g., the Twin Cities metropolitan area) and agricultural land, though deciduous forests are still prominent along the margins of rivers and in floodplains.

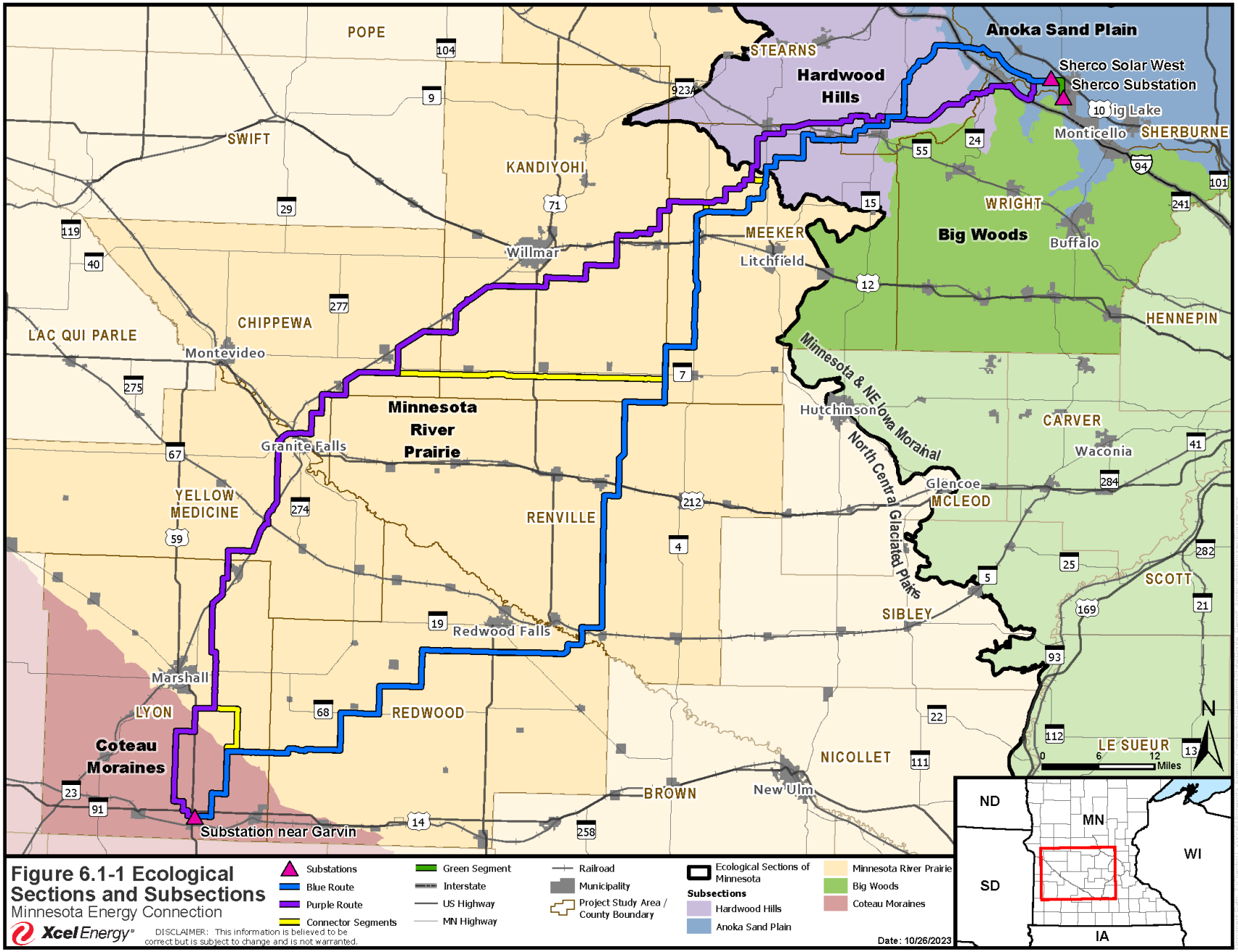

Figure 6.1-1 Ecological Sections and Subsections
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The Minnesota and NE Iowa Morainal Section is further broken down into ecological subsections, of which the Project Study Area overlaps the Hardwood Hills (222Ma), Anoka Sand Plain (222Mc), and Big Woods (222Mb) ecological subsections.

North Central Glaciated Plains Section

The North Central Glaciated Plains Section (251B) covers the southwestern corner of Minnesota and is dominated by calcareous till deposited by the Des Moines lobe during the last glaciation that is bisected by the Minnesota River valley (MNDNR, 2023b). However, in the southeasternmost portion of this section is the Prairie Couteau, a highland region that consists of glacial till and loess deposited prior to the Wisconsin glaciation. Landforms in this section predominantly consists of level to rolling hill plains, moraines, lake plains and outwash plains with smaller amounts of marsh, wetland prairie, and wet meadow. Pre-settlement vegetation in this section consisted of upland prairie with areas of wooded communities along river valleys. Today, most of this section is used for agricultural row crop production, but wooded communities are generally still present to varying degrees in river valleys.

Within the North Central Glaciated Plains Section, the Project Study Area is in the Minnesota River Prairie (251Ba) and Couteau Moraines (251Bb) subsections.

Topography within the Anoka Sand Plain and Hardwood Hills ecological subsections is generally rolling to undulating (860 to 1,460 feet above sea level). The Mississippi River is the main drainage channel in these subsections and creates a natural boundary between the Anoka Sand Plain and the Hardwood Hills ecological subsections. Topography in the Minnesota River Prairie and Couteau Moraines subsections is generally more level to slightly rolling (790 to 1,710 feet above sea level). The Minnesota River is the main drainage channel for both subsections and occurs as an abrupt gorge within the Minnesota River Prairie subsection.

Information about the existing environment along each route option is presented in Sections 6.1.1 and 6.1.2, from the northeast to the southwest Project Study Area.

6.1.1 Purple Route

The Purple Route begins at the Sherco Solar West Substation, north of the Mississippi River, in Sherburne County within the Anoka Sand Plain ecological subsection. About five miles after crossing into Wright County, the Purple Route enters clips the northern tip of the Big Woods ecological subsection, then enters the Hardwood Hills ecological subsection and continues to travel through this ecological subsection until about 10 miles after it crosses into Meeker County. At this point, the Purple Route enters the Minnesota River Prairie ecological subsection where it remains until crossing into the

Couteau Moraines ecological subsection in Lyon County, about 15 miles north of the route terminus. A description of each ecological subsection crossed by the Purple Route is provided below.

Anoka Sand Plain Subsection

The Anoka Sand Plain ecological subsection is characterized by flat, sandy lake plains and terraces along the Mississippi River, which forms the western boundary of the subsection separating it from the Hardwood Hills and Big Woods subsections. Landforms in the Anoka Sand Plain consist of small dunes, kettle lakes, and tunnel valleys that create a level to gently rolling topography. Sandy terraces are found along the Mississippi and its tributaries throughout the subsection. Bedrock outcrops can be found near St. Cloud and, in general, surface glacial deposits are less than 200 feet thick. Soils in the subsection are generally sandy, droughty upland soils with some organic soils in ice block depressions and tunnel valleys and poorly drained prairie soils along the Mississippi River. Most rivers and streams in this ecological subsection flow into the Mississippi River, though some flow east to the St. Croix River. Rivers, streams, and lakes are located in old glacial tunnel valleys, and peatlands occupy linear depressions of many of the tunnel valleys. Pre-settlement vegetation consisted of droughty uplands and oak barrens, open areas, and brushland, with narrow swaths of sand prairie and floodplain forest along the Mississippi River. Current land use in this subsection is a mix of urban development and agricultural production, such as sod and vegetable crop production in peat and muck areas.

Hardwood Hills Subsection

The Hardwood Hills ecological subsection is characterized by steep slopes, high hills, and lakes formed in glacial end moraines and outwash plains (MNDNR, 2023b). The western and southern boundaries are formed by the Alexandria Moraine Complex and the eastern boundary is based on the landform changes between land that was previously dominated by northern hardwoods and land dominated by conifer or aspen-birch forest. During the Wisconsin age glaciation, ice stagnation moraines, end moraines, ground moraines, and outwash plains were formed in this subsection. Kettle lakes are abundant within the moraines and outwash deposits and there are over 400 lakes greater than 160 acres in size. Most of this subsection is covered in 100 to 500 feet of glacial drift over diverse bedrock. Glacial drift is thickest in the northwestern half with Middle Precambrian bedrock locally exposed in the southeast along the Crow River. Loamy soils are dominant in this subsection with loamy sands and sandy loams on outwash plains, to loams and clay loams on moraines. The high ridge of the Alexandria Moraine is the headwaters region for many rivers and streams that flow east and west; the Chippewa, Long Prairie, Sauk, and Crow Wing are the major rivers in this subsection and the Mississippi River forms part of the eastern boundary. The

Hardwood Hills ecological subsection is split by the Continental Divide and waters north of the divide eventually flow toward Hudson Bay and waters south of the divide flow into the Mississippi River system. While pre-settlement vegetation was dominated by woodland or forest, much of the land has been cleared and is currently used for agricultural production, though some forested areas remain along the margins of the lakes and steep areas. Tourism in areas around lakes is a significant contributor to the local economy.

Big Woods Subsection

The Big Woods ECS is characterized by a large block of deciduous forest, present at the time of Euro-American settlement, that separates the Anoka Sand Plain from the tallgrass prairie to the southwest (MNDNR, 2023b). The Mississippi River and extensive outwash and lake plain define the northern boundary of this subsection and distinguish it from the Hardwood Hills subsection. Topography is gently to moderately rolling, and the primary landform is a loamy mantled moraine formed by the Des Moines lobe of the late Wisconsin glaciation. Circular, level-topped hills with smooth side slopes dominate the landscape, with broad level areas between the hills that contain closed depressions with lakes and peat bogs. More than 100 lakes greater than 160 acres in size are present within this subsection. Drainage within this subsection is undeveloped and is generally controlled by groundwater with no inlets or outlets. Soils are predominantly loamy and range from loam to clay loam formed by the calcareous glacial till of the Des Moines lobe, with depth to bedrock ranging between 100 and 400 feet. Major rivers within this subsection are the Minnesota River, which bisects the Big Woods subsection, and the Crow River and its tributaries. Most of the land in this subsection is currently used for agricultural production, including row crop agriculture and pastureland (collectively about 80-85 percent). Areas not used for agricultural production generally consist of upland forest and wetlands.

Minnesota River Prairie Subsection

The majority of the Purple Route is within the Minnesota River Prairie ecological subsection, including all or portions of the route in Meeker, Kandiyohi, Chippewa, Renville, Yellow Medicine, and Lyon Counties. The Minnesota River Prairie ecological subsection is characterized by large till plains that are bisected by the broad valley of the Minnesota River (MNDNR, 2023b). The Minnesota River was formed by Glacial River Warren which drained Glacial Lake Agassiz. Topography is steepest along the Minnesota River and the Big Stone Moraine, which has steep kames and broad slopes, while topography outside of the river valley consists of level to gently rolling ground moraine. Glacial drift generally ranges between 100 and 400 feet throughout this subsection. Soils are predominantly well-to-moderately well-drained loams formed in gray calcareous till of the Des Moines lobe with some localized inclusions of clayey,

sandy, and gravelly soils. Streams and small rivers drain into the Minnesota River or the Upper Iowa River, though drainage networks are poorly developed due to landscape characteristics. There are 150 lakes greater than 160 acres in size throughout this subsection, though many are shallow. Wetlands were common within this subsection prior to Euro-American settlement, and most have been drained to establish usable cropland. Prior to Euro-American settlement, vegetation in this subsection was predominantly tallgrass prairie interspersed by many islands of wet prairie and areas of deciduous forest along the margins of the Minnesota River, floodplains, and other small streams. Current land use in the subsection is dominated by agricultural activity and remnants of tallgrass prairie are rarely found.

Coteau Moraines Subsection

The final 15 miles of the Purple Route in Lyon County are within the Coteau Moraines ecological subsection. The Coteau Moraines ecological subsection is characterized as a transition from shallow deposits of windblown silt (loess) over glacial till to deeper deposits of loess (MNDNR, 2023b). A high glacial landform in Southwestern Minnesota distinguishes this subsection and stretches through Southwestern Minnesota, Southeastern South Dakota, and Northwestern Iowa. The Couteau Moraines subsection is split into two distinct landforms: the middle Couteau and the outer Couteau. Landforms in the middle Couteau are rolling moraine ridges of late-Wisconsin drift mantled with loess 1 to 3 feet thick while landforms in the outer Couteau are a series of terminal and end moraines separated by ground moraines that range from gently undulating to steeply rolling and hilly. A steep escarpment that is cut by several streams within narrow, straight ravines marks the northeast edge of the subsection. Soils are loamy and well-drained with thick dark surface horizons. The Couteau Moraines ecological subsection primarily drains into the Minnesota River system or southeast into Iowa. The middle Couteau has few lakes and a moderately developed dendritic drainage network. In contrast, the outer Couteau has a poorly developed drainage network comprised primarily of glacial till where a greater number of wetlands and lakes have formed. Prior to Euro-American settlement, vegetation in this ecological subsection was almost entirely tallgrass prairie. Wet prairies were less common than in the Minnesota River Prairie subsection and are generally restricted to narrow stream margins, and forests were similarly restricted to ravines along a few streams, such as the Redwood River. Land in this subsection is currently used for agricultural production and remnants of pre-settlement vegetation (i.e., tallgrass prairie) are rare (MNDNR, 2023b).

6.1.2 Blue Route

The Blue Route also begins at the Sherco Solar West Substation, within the Anoka Sand Plain ecological subsection, and follows the same path as the Purple Route for about 2.0 miles before turning west to continue through the Anoka Sand Plain ecological subsection until about three miles past the Stearns County border where it crosses into the Hardwood Hills ecological subsection. The Blue Route continues traveling through this ecological subsection until about 13 miles after it crosses into Meeker County. At this point, the Blue Route crosses into the Minnesota River Prairie ecological subsection where it remains until crossing into the Couteau Moraines ecological subsection in Lyon County, about 10 miles north of the route terminus.

A description of the environmental setting in the Anoka Sand Plain, Hardwood Hills, Big Woods, Minnesota River Prairie, and Coteau Moraines ecological subsections is provided with the description of the Purple Route in Section 6.1.1. Because the Blue Route crosses the same ecological subsections as the Purple Route, the description of the landforms, soils, pre-settlement vegetation, and current land uses provided in Section 6.1.1 also applies to the area crossed by the Blue Route.

6.2 HUMAN SETTLEMENT

Transmission lines and substations have the potential to impact human settlements during construction and operation of a project, which can be avoided, minimized, or mitigated with proper planning and siting practices. Potential public and health and safety issues during construction include injuries due to falls, equipment use, and electrocution. Potential health concerns related to operation of a transmission line including health impacts from electric and magnetic fields (EMF), stray voltage, induced voltage, impaired air quality, and electrocution. Transmission lines and substations also have the potential to displace homes or businesses, introduce new noise sources, affect the aesthetics and socioeconomics of the region in which the project would occur, be incompatible with local land use and zoning, interfere with electronic communications, and impact public services (e.g., transportation).

The following subsections present an overview of the resources related to human settlement in the Project Study Area and discuss how the Project may affect these resources and what measures Xcel Energy will implement to mitigate Project effects.

The route options presented in this Application originate from Xcel Energy's Sherco Substation which is located within the Becker city limits in Sherburne County, south of the Sherco Generating Plant and north of the Mississippi River. Scattered residential areas exist on either side of the Mississippi River between Becker and St. Cloud, and as such the northern portions of the route options pass through areas that are more

densely populated. As the route options travel southwest toward Lyon County, population centers and residential areas are smaller and farther apart and agricultural fields dominate the landscape.

Reservations for two Tribal Nations are present within the Project Study Area along the Minnesota River in Yellow Medicine and Redwood Counties: the Upper Sioux Community Pezihutazizi Oyate and the Lower Sioux Indian Community in the State of Minnesota. No reservations are crossed by the routes proposed in this Application.

The sections below identify areas of human settlement crossed by the route options and are followed by sections which identify and describe potential Project impacts to specific human settlement resources in more detail.

Purple Route

The Purple Route passes through Sherburne, Wright, Stearns, Meeker, Kandiyohi, Chippewa, Renville, Yellow Medicine, and Lyon Counties. The Purple Route begins just outside of the municipal boundary of the City of Becker. After this point, the Purple Route generally avoids municipalities until it reaches Yellow Medicine County where the 1,000-foot-width of this route option clips the southeastern corner of the municipal boundary of Hanley Falls which according to the 2020 U.S. Census, has a population of 243 persons (U.S. Census Bureau, 2020). Neither the 150-foot right-of-way nor the Application alignment within the Purple Route cross the municipal boundary of Hanley Falls. Additional cities in proximity to the Purple Route include Clearwater (0.4 mile north), Kimball (0.5 mile south), Watkins (0.4 mile south), Eden Valley (0.3 mile north), Atwater (0.8 mile southeast), Kandiyohi (1.4 miles north), Wilmar (0.7 mile west), Raymond (0.4 mile west), Clara City (0.4 mile west), Maynard (0.3 mile west and north), Granite Falls (0.1 mile south), Cottonwood (0.1 mile east), Marshall (0.8 mile west), Balaton (3.0 miles southwest), and Garvin (1.0 south). Outside these cities, human settlement is lightly distributed across the landscape at farmsteads.

The Upper Sioux Community Pezihutazizi Oyate reservation is located along the Minnesota River valley in Yellow Medicine County and the Purple Route is 2.2 miles west of the reservation boundary. In addition, an area of off-reservation Upper Sioux Community Pezihutazizi Oyate trust land is directly adjacent to the western boundary of the reservation; the Purple Route does not cross the adjacent trust land.

Blue Route

The Blue Route passes through Sherburne, Stearns, Meeker, Kandiyohi, Renville, Redwood, and Lyon Counties. Because the beginning of the Purple and Blue Routes are the same, the beginning of the Blue Route is also located just outside of the municipal boundary of Becker. After this point, the Blue Route avoids municipalities until after crossing the Mississippi River at which point the route crosses the municipal boundary of Saint Augusta in Stearns County for about 6 miles. According to the 2020 U.S. Census, Saint Augusta has a population of 3,497 persons (U.S. Census Bureau, 2020). The Blue Route generally avoids residential areas within Saint Augusta and parallels parcel boundaries and field edges to the extent practicable. The main population center of Saint Augusta is about 1.5 miles north of the Blue Route. In southern Stearns County, the Blue Route is adjacent to the municipal boundary of Kimball but does not cross it. The Blue Route avoids municipalities as it travels through Meeker, Kandiyohi, and Renville Counties until it gets closer to the Minnesota River. Prior to crossing the river, the route crosses the northern municipal boundary of Franklin, which according to the 2020 U.S. Census has a population of 493 persons (U.S. Census Bureau, 2020). One farmstead is located within this portion of Franklin and the main population area of the town is located about 0.5 mile south of the Blue Route. The Blue Route also crosses the southern municipal boundary of Lucan in Redwood County. The width of the Blue Route is expanded to 1.25 miles in this location to allow flexibility for siting the Intermediate Substation, and the southern quarter of the main population center of Lucan is within the route width. According to the 2020 U.S. Census, Lucan has a population of 214 persons (U.S. Census Bureau, 2020). South of Lucan, the Blue Route avoids municipalities.

Additional municipalities in proximity to the Blue Route include Clear Lake (1.4 miles northeast), Clearwater (0.7 mile south/southwest), Watkins (0.2 mile north), Grove City (0.2 mile east), Atwater (2.9 miles west), Cosmos (1.9 miles east), Bird Island (1.2 miles west), Morton (2.3 miles west), Redwood Falls (2.0 miles north), Seaforth (2.4 miles west), Wabasso (2.2 miles south), and Tracy (2.5 miles southeast). Outside these cities, human settlement is lightly distributed across the landscape at farmsteads.

The Lower Sioux Indian Community in the State of Minnesota reservation is located within the Minnesota River valley in Redwood County. The southeastern boundary of the reservation is about 0.5-mile northwest of the Blue Route.

6.2.1 Public Services

6.2.1.1 Police, Fire, and Ambulance Services

Public services in the Project Study Area are provided by local law enforcement and emergency response agencies of nearby communities. The sheriff's offices and municipal police departments in nearby towns provide law enforcement in the area. Sherburne, Stearns, Wright, Kandiyohi, Meeker, Chippewa, Renville, Yellow Medicine, Redwood, and Lyon counties all have well equipped sheriff departments that provide services to their respective counties. Additionally, the cities of Becker, Eden Valley, Willmar, Granite Falls, Redwood Falls, Marshall, and Tracy all have local police departments. Fire services within the area are provided by city and community fire departments. Becker, Hanley Falls, Clearwater, Kimball, Watkins, Eden Valley, Atwater, Kandiyohi, Willmar, Raymond, Clara City, Maynard, Granite Falls, Cottonwood, Marshall, Balaton, Garvin, Saint Augusta, Franklin, Clear Lake, Grove City, Cosmos, Bird Island, Morton, Redwood Falls, Seaforth, Wabasso, Lucan, and Tracy all have fire departments that service the surrounding cities and townships.

Ambulance districts provide emergency medical response services to the Project. Sherburne County has five ambulance districts. Stearns County has six ambulance districts. Wright County has 10 ambulance districts. Kandiyohi County has eight ambulance districts. Meeker County has five ambulance districts. Chippewa County has seven ambulance districts. Renville County has eight ambulance districts. Yellow Medicine has five ambulance districts. Redwood County has nine ambulance districts. Lyon County has five ambulance districts. Emergency medical response is also available from local hospitals, such as the Buffalo Hospital, CentraCare – Rice Memorial Hospital, and Hutchinson Health Hospital.

There are 41 towers that are a part of the Allied Radio Matrix for Emergency Response (ARMER) in counties crossed by the Purple Route, including Sherburne, Stearns, Wright, Kandiyohi, Meeker, Chippewa, Renville, Yellow Medicine, and Lyon Counties (Minnesota Department of Public Safety, 2018). There are 31 towers that are a part of the ARMER in counties crossed by the Blue Route, including Sherburne, Stearns, Kandiyohi, Meeker, Renville, Redwood, and Lyon Counties (Minnesota Department of Public Safety, 2018). These ARMER towers are a part of Minnesota's Statewide Communication Interoperability Plan, which aims to improve communication for emergency responders.

6.2.1.2 Hospitals

Large hospitals in the Project Study Area include the Buffalo Hospital, CentraCare – Rice Memorial Hospital, and Hutchinson Health Hospital in the cities of Buffalo, Willmar, and Hutchinson, respectively. Small medical centers in the area are located in populated municipality centers, such as the CentraCare Clinics located in Becker, Clearwater, Willmar, Redwood Falls, Eden Valley. The Project Study Area also includes various other medical services offices.

6.2.1.3 Water and Wastewater Services

In the rural areas within the Project Study Area, residents often utilize privately-owned septic systems and wells. In the more urban areas, municipal water and sewer services provide water and wastewater services. Within proximity to the route options, Becker, Kimball, Willmar, Granite Falls, Redwood Falls, and Marshall have municipal water and sewer services.

6.2.1.4 School Districts

There are 64 school districts in the counties that make up the Project Study Area. There are 15 school districts crossed by the Purple Route and 15 school districts crossed by the Blue Route. The Purple and Blue Routes both cross A.C.G.C. Public School District (Independent School District [ISD] 2396), Becker Public School District (ISD 0726), Eden Valley-Watkins School District (ISD 0463), Kimball Public School District (ISD 0739), Litchfield Public School District (ISD 0465), Marshall Public School District (ISD 0413), St. Cloud Public School District (ISD 0742), and Tracy Area Public School District (ISD 2904).

Additionally, the Purple Route crosses Annandale Public School District (ISD 0876), Lakeview School District (ISD 2167), MACCRAY School District (ISD 2180), Monticello Public School District (ISD 0882), Prinsburg Public School District (ISD 0815), Willmar Public School District (ISD 0815), and Yellow Medicine East (ISD 2190). The Blue Route also crosses Bird Island-Olivia-Lake Lillian Public School District (ISD 2534), Buffalo Lake-Hector-Stewart Public Schools (ISD 2159), Cedar Mountain School District (ISD 2754), Milroy Public School District (ISD 0635), Redwood Area School District (ISD 2897), Wabasso Public School District (ISD 0640), and Westbrook-Walnut Grove Schools (ISD 2898).

6.2.1.5 Utilities

Electric utilities in the Project Study Area are provided by Minnesota Municipal Power Agency, Kandiyohi Power Cooperative, Delano Municipal Utilities, Fairfax Municipal Utilities, Glencoe Light & Power, Granite Falls Municipal Utilities, Grove City Utilities Department, Hutchinson Utilities, Litchfield Public Utilities, Marshall Municipal Utilities, New Ulm Public Utilities, Redwood Falls Public Utilities, Sleepy Eye Public Utilities, Springfield Public Utilities, and Willmar Municipal Utilities. Natural gas service in the Project Study Area is provided by CenterPoint Energy, Great Plains Natural Gas Company, Minnesota Energy Resources Corporation, Sheehan's Gas Company, and Xcel Energy.

In addition, the route options cross the following pipelines based on review of the National Pipeline Mapping System (2023):

- The Purple Route crosses:
    - one Northern Natural Gas natural gas pipeline (10-inch diameter pipeline) in Stearns County;
    - the MinnCan Project crude oil pipeline in Meeker County;
    - one Northern Natural Gas pipeline and one Alliance natural gas pipeline (36-inch-diameter) in Kandiyohi County;
    - one Northern Natural Gas natural gas pipeline in Yellow Medicine County; and
    - one Northern Natural Gas natural gas pipeline and one Northern Border natural gas pipeline (42-inch-diameter pipeline) in Lyon County.
- The Blue Route crosses:
    - two Northern Natural Gas natural gas pipelines (10-inch-diameter pipeline) in Stearns County;
    - the MinnCan Project crude oil pipeline and two Northern Natural Gas natural gas pipelines (8-inch-diameter pipeline) in Meeker County;
    - one Northern Natural Gas natural gas pipeline (8-inch-pipeline) at the Meeker County and Kandiyohi County border; and
    - one Alliance natural gas pipeline (36-inch-diameter pipeline) and one Northern Natural Gas natural gas pipeline in Renville County.

6.2.1.6 Other Public Services

There are many other public services that are provided in the Project Study Area, primarily within municipalities. Public works and utility departments design, construct, and maintain sanitary sewers, streets and sidewalks, parks, public landscaping, and water mains. Additional public facilities exist within incorporated areas in the Project Study Area, including swimming pools, ice rinks, parks, and libraries.

6.2.1.7 Public Services Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact the availability of emergency and public health services, public services, and safety of the local populace during construction. The influx of temporary construction personnel could increase demand for emergency and public health services and increase enrollment in local school districts, if non-local personnel are accompanied by their families. If construction personnel are injured or require assistance due to falls, equipment use, or electrocution this creates a demand for emergency, public health, or safety services that would not exist if the Project did not exist. If road closures are required during construction, such closures could impede police, fire, and other rescue vehicles access to the site of an emergency. Furthermore, use of clear and appropriate signage during construction of a transmission line or substation is required to ensure public safety.

The location of existing utilities is another factor to be considered when siting a transmission line or substation. While co-location with existing utilities is encouraged, any co-location with existing utilities should be done in a way that avoids impacting the safe operation and routine maintenance of those utilities.

Operating transmission lines and substations are required to meet certain safety qualifications and standards such as fencing of substation facilities or energized equipment to prevent public access. In addition, construction of towers or transmission lines must consider potential effects on existing emergency communication systems to avoid line-of-sight disturbances.

Construction of the Project is anticipated to result in the presence of additional workers in the area. This temporary influx of workers for Project construction would not be expected to influence emergency response or availability of public or utility services. Construction of the Project may also result in temporary road closures. The Applicant will attempt to minimize road closures, and any temporary road closures required during construction would be coordinated with local jurisdictions to provide safe access of police, fire, and other rescue vehicles. Local law enforcement resources may be utilized for traffic control and law enforcement during construction activities. If emergency services are needed for local residents during the Project construction phase,

construction in the vicinity of the emergency site will stop, and any impeding equipment will be relocated so that emergency vehicles may access the emergency site.

Safety is of the highest concern for the design, construction, and operation of the Project. The Project will be designed to local, state, and NESC safety standards. Proper signage around Project facilities will warn the public of the safety risks associated with the energized equipment. In addition, all substations will be fenced to prevent public access. The Project will be equipped with protective devices (circuit breakers and relays located in substations where transmission lines terminate) to safeguard the public in the event of an accident, or if a structure or conductor falls to the ground. The protective equipment will de-energize the transmission line should such an event occur.

Xcel Energy is gathering information to coordinate with all emergency and non-emergency response teams for the Project, including law enforcement agencies, local fire departments, ambulance services, and 911 services. Construction crews will comply with Occupational Safety and Health Administration measures to ensure their own safety. Any accidents that might occur during construction of the Project would be handled through local emergency services. The type and number of responding agencies will depend on the incident requiring emergency services. Xcel Energy will develop an operations and emergency action plan for the Project that outlines local contacts (first responders and internal operation and maintenance staff) and emergency procedures for evacuation, fire response, extreme weather, injury, and criminal behavior. Once construction is complete, the Project will not impede emergency services. As such, construction and operation of the Project will have minimal impacts on the availability of emergency services.

Though ARMER towers are present in the counties crossed by the Purple and Blue Routes, neither route crosses any municipalities with ARMER site locations. Due to the distance, the Project will not interfere with this communication system. Most transmission line structures will be less than the typical height of an ARMER tower (i.e., 150 feet above ground). Dead-end structures at substation sites, existing transmission or distribution line crossings, and river crossings may exceed this height.

The Applicant will use the Gopher State One-Call system to locate and mark all existing underground utilities prior to construction to avoid impacts on pipelines. If crossing an underground utility is required, the Applicant will use BMPs to protect existing infrastructure while using heavy equipment during construction (e.g., construction matting) and will coordinate with the utility owner.

Regardless of which route is constructed, impacts to public health and safety from Project construction or operation are not anticipated. The Applicant will work with the appropriate authorities (including emergency services) and utility providers to

determine where facilities exist and how to best ensure the proper safety precautions are being met. The Applicant will meet with residents and utility providers to prevent direct or indirect impacts to their services. Overall, public service and facilities are not anticipated to be impacted by the construction and operation of the Purple or Blue Routes.

6.2.2 Proximity to Residences

In its development of the routes presented in this Application, the Applicant attempted to minimize impacts to residences. Table 6.2.2-1 summarizes the number of residences within and up to 500 feet from the Application alignments, based on desktop review of aerial imagery.

Table 6.2.2-1 Proximity of Residences to the Application Alignments

Residence Proximity (Feet)	Purple Route	Blue Route
0-75	0	0
76-150	8	8
151-300	68	61
301-500	79	68
Total Residences	**155**	**137**

There are no residences within the Purple Route Proposed Right-of-Way. There are eight residences within 150 feet of the Purple Route's Application alignment and 155 residences within 500 feet of the Application alignment. The closest residence is 106 feet east of the Application alignment.

There are no residences within the Blue Route Proposed Right-of-Way. There are eight residences within 150 feet and 137 residences within 500 feet of the Application alignment. The closes residence is 111 feet northwest of the Application alignment.

6.2.2.1 Impacts and Mitigation – All Routes

Displacement is defined as compelling a person or persons to leave their home. For transmission lines, NESC standards require certain clearances between transmission line facilities and the ground, and between transmission line facilities and buildings for safe operation of the transmission line. To comply with NESC standards and allow sufficient space for transmission line maintenance, transmission lines are generally routed to avoid residences or other buildings within the right-of-way. Residences or other buildings located within a proposed right-of-way that cannot be avoided are generally removed or displaced. Displacements are relatively rare and are more likely to occur in heavily populated areas where avoiding all residences and businesses is not always feasible.

The Application alignments were developed to avoid displacement of residences. There are no residences within the right-of-way or within 100 feet of the Application alignments of the Purple or Blue Routes. No displacement of residences is anticipated if either route is selected by the Commission.

While residences are present with the expanded route widths requested for the substation sites in both the Purple and Blue Routes, the Applicant will seek to identify a substation site that does not displace existing residences.

6.2.3 Noise

Sound is caused by the vibration of air molecules and is measured on a logarithmic scale with units of decibels (dB). The MPCA defines noise as undesired sound. Sound is composed of various frequencies, which are measured in hertz (Hz), or the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 Hz to 20,000 Hz. Typically, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighted scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighted scale emphasizes sounds in the range of frequencies that the average human ear perceives and deemphasizes frequencies that people do not hear as well, such as very high and very low frequencies. Any sound level to which the A-weighted scale has been applied is expressed in A-weighted decibels, (dBA). For reference, the A-weighted sound pressure levels of with some common noise sources are listed in Table 6.2.3-1.

Table 6.2.3-1 Common Noise Sources

Sound Pressure Level (dBA)	Common Noise Source
110	Rock band at 5 m
100	Jet flyover at 300 m
90	Gas lawn mower at 1 m
85	Food blender at 1 m
75	Shouting at 1 m
70	Vacuum cleaner at 3 m
60	Normal speech at 1 m
55	Large business office
50	Dishwasher in next room, quiet urban daytime
40	Library, quiet urban nighttime
30	Bedroom at night
20	Quite rural nighttime
0	Threshold of hearing

Source: MPCA, 2015

The MPCA has promulgated noise standards in Minnesota Rules Chapter 7030. These standards limit the level of sound based on the noise area classifications (NAC)

determined at the location of the person who hears the noise. Residences are in the most restrictive NAC and are classified as NAC 1, business areas are classified as NAC 2, and industrial/agricultural areas are classified as NAC 3. A fourth area, NAC 4, is defined as undeveloped and unused land, but no noise standards apply to this land class. The noise standards specify the maximum allowable noise levels at a receptor and cannot be exceeded for more than 10 percent of an hour (L_{10}) or 50 percent of an hour (L_{50}). The MPCA's noise standards for daytime hours and nighttime hours are shown in Table 6.2.3-2.

Table 6.2.3-2 MPCA State Noise - Standards Hourly A-Weighted Decibels

Noise Area Classification	Daytime (7:00 a.m. – 10:00 p.m.)		Nighttime (10:00 p.m. – 10:00 a.m.)	
	L_{10}	L_{50}	L_{10}	L_{50}
1 – Residential	65	60	55	50
2 – Commercial	70	65	70	65
3 - Industrial	80	75	80	75
Source: Minn. R. § 7030.0040				

Ambient sound levels can be highly variable and are influenced by the sound sources in the immediate area. Existing noise levels in the Project Study Area would be largely influenced by levels of traffic on roads, agricultural activity during planting and harvest seasons, and suburban sounds like barking dogs and lawn mowers, or natural sounds from wind or insects.

Construction will involve the use of construction equipment and noise will occur during the installation of the Project facilities. Construction noise is highly variable as the types of equipment in use at a construction site change with the construction phase and the type of activities. The typical noise levels of construction equipment generally used in construction activities are presented in Table 6.2.3-3.

Table 6.2.3-3 Typical Noise Levels of Major Construction Equipment

Generic Construction Equipment	Sound Level at 50 ft, dBA
Backhoe	80
Compactors (rollers)	80
Compressor (air)	80
Concrete Mixer Truck	85
Cranes (movable)	85
Dozers	85

Table 6.2.3-3 Typical Noise Levels of Major Construction Equipment	
Generic Construction Equipment	**Sound Level at 50 ft, dBA**
Front End Loaders	80
Generators	82
Graders	85
Jack Hammers and Rock Drills	85
Pavers	85
Pumps	77
Scrapers	85
Tractors	84
Source: FHWA, 2006	

6.2.3.1 Impacts and Mitigation – All Routes

Transmission Line

Transmission line projects have the potential to create temporary increases in noise during construction from operation of construction vehicles and equipment. Construction of the transmission line will utilize equipment that will cause audible noise (refer to Table 6.2.3-3). Noise from construction activities may be noticeable at nearby residences. Construction noise would only occur when active construction is taking place, and impacts are not anticipated to vary among route options. Additionally, construction will typically occur during daytime hours. Construction activity would only be present at a particular location periodically between right-of-way clearing and restoration. As such, construction noise would be highly localized, temporary, and minor.

During operations in fair conditions, noise from the transmission line is anticipated to be inaudible. The transmission line may produce noise during rainy conditions due to the corona effect, a type of electrical conduction that occurs in the atmosphere near the conductor that may result in an audible hissing and cracking sound. Typically, however, when climatic conditions result in corona, the noise levels of falling rain would exceed the corona noise making the noise from the transmission line inaudible. Table 6.2.3-4 provide representative noise data for typical structures and distances from structures for the 345 kV lines. Noise levels may vary but are anticipated to be below applicable state standards.

Table 6.2.3-4 Noise Levels (L_{50}) for Typical Structures at Distances from 0 to 300 Feet				
Operating Voltage	**Noise L_{50} dBA [1]**			
	0 feet	**75 feet**	**150 feet**	**300 feet**
345/345 kV Double-Circuit Monopole	46	40	38	36
[1] L_{50} is defined as the noise level exceeded 50 percent of the time, or for 30 minutes in an hour.				

Substations

Construction of the substations also will utilize equipment that will cause audible noise (refer to Table 6.2.3-3). Noise from construction activities may be noticeable at nearby residences. Construction noise would only occur when active construction is taking place, and impacts are not anticipated to vary between the route options presented in this Application. Additionally, construction will typically occur during daytime hours. Construction activity may be present at a particular location for 12 to 18 months throughout the construction of the substation facility. Construction noise would be localized and minor.

Operation of substations also cause audible noise. Transformer or shunt reactor "hum" is the dominant noise source at substations. At substations without transformers or shunt reactors, only infrequent noise sources would exist such as the opening and closing of circuit breakers or the operation of an emergency generator. Typical substation design is such that noise produced by these sources does not reach beyond the substation properties, meaning that the substations would comply with applicable state noise standards at the nearest receptor(s).

6.2.4 Aesthetics

The topography of the Project Study Area is generally flat, with areas of rolling plains. The vegetation cover is uniformly low, making the topography in some areas susceptible to visual disruptions. In other areas, such as riparian zones surrounding many streams and rivers, there is more topography and higher vegetative cover.

The Purple and Blue Routes are in proximity to several municipalities but most of the land crossed is open space. While predominately open space, the landscape is already dotted with various structures, including energy infrastructure. Throughout the Project Study Area, rural residences and farm buildings (inhabited and uninhabited farmsteads) are scattered along rural county roads. Farmstead structures are focal points in the dominant open space of the Project Study Area.

Wind turbines and solar panels are visible from many locations along the route options, including the Sherco Solar Project that is near the northern terminus of the Project

(both route options) and the Palmer's Creek Wind Farm near Granite Falls (Purple Route).

Scenic byways are present in the Project Study Area. Scenic byways are public roadways located in areas of regionally significant scenic, natural, recreational, cultural, historic, or archaeological resources (MNDOT, 2023a). Scenic byways can be either national or state designations. In Minnesota, the Great River Road National Scenic Byway follows the Mississippi River spanning 565 miles across 20 counties (Explore Minnesota, 2023a). The Purple Route will cross the Great River Road in Wright County where it coincides with Interstate 94. The Blue Route would also cross Great River Road where it coincides with Interstate 94, but the crossing is in Stearns County northwest of where the Purple Route crosses the scenic byway.

The Minnesota River Valley National Scenic Byway follows the path of the Minnesota River through central Minnesota via a series of public roadways between Big Stone Lake and Belle Plaine (Explore Minnesota, 2023b). The Purple Route crosses this scenic byway when it crosses Highway 212 in Yellow Medicine County, just south of the Minnesota River crossing. The Blue Route will cross the Minnesota River Valley Scenic Byway when it crosses County Road 51 in Renville County, just north of the Minnesota River crossing.

6.2.4.1 Impacts and Mitigation – All Routes

Transmission lines and substations have the potential to affect the aesthetics of an area if they contrast with the surrounding landscape or designated scenic resources (e.g., federally or state-designated trails and byways).

The Project will result in an alteration of the current landscape through construction of single-pole, double-circuit structures of approximately 90 to 160 feet in height; in areas where existing transmission lines would be crossed, structures may be up to 195-feet in height. The Applicant developed the Purple and Blue Routes to parallel existing linear infrastructure (e.g., roadways, electric transmission and distribution lines) to minimize visual disruptions in the predominantly rural landscape to the extent practicable. Paralleling existing infrastructure groups these features into common corridors and helps to minimize the amount of cleared linear corridors that would otherwise break up the existing landscape. The transmission line may be visible from municipalities near the route options, but the transmission line would be similar to existing infrastructure in these communities.

In addition to developing routes that parallel existing transmission lines and roads, the Applicant also developed route options that follow section lines and property lines to the extent practicable and avoid placing any residences within the 150-foot rights-of-

way of the proposed Application alignments (refer to Figure 4.4-1). By routing along linear features and avoiding existing residences where practicable, the Applicant has minimized impacts to the viewshed from homes to the greatest extent possible. However, given the relatively flat landscape in the Project Study Area, the transmission line would likely be visible from residences and passersby on local roadways.

The Purple Route crosses rivers including the Mississippi River, Fish Creek, Clearwater River, the North Fork of the Crow River, Minnesota River, and Yellow Medicine River. The Purple Route also would cross the Great River Road and the Minnesota River Valley National Scenic Byways, near the river crossings of the Mississippi and Minnesota Rivers. The Purple Route parallels an existing 69 kV transmission line crossing at the Mississippi River and several existing transmission line crossings of the Minnesota River west of Granite Falls.

The Blue Route crosses rivers including the Mississippi River, the Minnesota River, and the Redwood River. The Blue Route would cross the Great River Road and the Minnesota River Valley National Scenic Byways near the river crossings of the Mississippi and Minnesota Rivers. The Blue Route does not parallel existing transmission lines where it crosses the Mississippi River, but existing transmission lines are present where the Blue Route crosses Great River Road. The Blue Route will parallel an existing 69 kV transmission line crossing at the Minnesota River and where it crosses the Minnesota River Valley Scenic Byway. The proposed double circuit structures will be visible from these features but the viewshed impacts are anticipated to be minor and similar to other infrastructure in these areas.

The substations proposed for the Project would alter the current visual landscape to varying degrees. Modifications to the Sherco Substation and the Sherco Solar West Substation would be similar in nature to the existing substations and other transmission lines and industrial infrastructure in the vicinity. The Terminal Substation, Intermediate Substation, and the Voltage Support Substation would be new industrial features in the otherwise rural landscape and would be visible to passersby on local roadways.

6.2.5 Cultural Values

Cultural values include those perceived community attitudes or beliefs that provide a framework for community unity. The Project Study Area is predominantly rural in nature with an agriculture-based economy. Corn and soybean crop production, livestock operations, and associated industries drive the local agricultural economy. While manufacturing and service industries (restaurants, hotels, repair shops, convenience and retail stores) are concentrated in the municipal population centers dotted throughout the Project Study Area. Farming and protection of agriculture, the

land, and the ability to continue to farm and support livelihoods through agriculture are strong values within the Project Study Area.

Central Minnesota is known for its lakes and wooded hills (Explore Minnesota, 2023c). Sherburne County is home to the Sherburne History Center, Oliver H. Kelley Farm, and Munsinger Gardens & Clemens Gardens (Sherburne County, 2023). The Wright County Fair is a large summer attraction that takes place in Howard Lake (Wright County, 2023). The Willmar Lakes Area in Kandiyohi County offers a wide range of outdoor and water-based activities (Willmar Lakes Area, 2023). Meeker County has many points of historical interest such as the Brightwood Beach Cottage and the Litchfield Opera House (Meeker County Minnesota, 2023). The Chippewa County Historical Society maintains the Historic Chippewa City, which is a replication of a late 1800's village (Chippewa County Historical Society, 2023). Renville and Yellow Medicine Counties are the location of several historic sites.

In Southwest Minnesota, Lyon and Redwood Counties have plentiful arts and culture sites (Explore Southwest Minnesota, 2023d). The Marshall Area Fine Arts Council and the Southwest Minnesota Arts Council are both located in Lyon County. Lyon County is also home to the Schwan's Center for Performing Art and the Marshall Area Stage Company. The Laura Ingalls Wilder Pageant takes place in Redwood County. Southwest Minnesota State University is located in Marshall and has theatre and arts facilities.

Numerous natural amenities, including lakes, rivers, and WMAs, attract local and regional recreational users nearby both route options (refer to Section 6.2.8). These areas are also important to the identity of the area and provide opportunities for various recreational activities such as fishing, hunting, and snowmobiling which are also part of the identity of area residents.

Tribal Nations

The Minnesota River Valley is an area of cultural significance for the Upper Sioux Community Pezihutazizi Oyate and Lower Sioux Indian Community, as well as other Tribal Nations whose ancestors previously inhabited the Project Study Area.

The Upper Sioux Community Pezihutazizi Oyate refers to the area surrounding the Minnesota River as Pezihutazizi Kapi (the Place where they did for yellow medicine) (Upper Sioux Community Pezihutazizi Oyate, n.d.). The Upper Sioux Community Pezihutazizi Oyate holds a traditional Wacipi (i.e., powwow) annually in Granite Falls on the first weekend in August. Wacipi is a cultural tradition that brings generations together to dance, sing, and celebrate their heritage.

The Lower Sioux Indian Community are part of the Mdewakanton Band of Dakota and refer to the Minnesota River Valley as Cansa'yapi (where they marked the trees red) (Lower Sioux Indian Community, 2023). The Lower Sioux Indian Community manages the Lower Sioux Agency Historic Site in Morton, which is the site where the U.S. Dakota War started in 1862. The Lower Sioux Indian Community also holds an annual Wacipi in the Land of Memories Park in Mankato during the third weekend in September.

6.2.5.1 Impacts and Mitigation – All Routes

Community and regional events focused on ethnic heritage or regionally important industry (e.g., agriculture) are a common expression of cultural values. Transmission line and substation projects have the potential to impact public participation in community and regional events during construction or operation of these projects.

Construction of the Project is not expected to conflict with the cultural values along either of the proposed route options. The Project Study Area is predominantly rural in nature with an agriculture-based economy and is anticipated to remain so after construction. None of these aspects of the culture of the area are anticipated to be significantly impacted or changed as a result of the construction and operation of the Project. Substations are not anticipated to impact cultural values because these facilities would be limited to a discrete area and would be sited to avoid impacting public participation in community and regional events.

The Applicant is committed to coordinating with Tribal Nations that may have an interest in the Project to avoid or minimize impacts on areas of cultural significance, including the Upper Sioux Community Pezihutazizi Oyate and Lower Sioux Indian Community. Additional information about Xcel Energy's coordination with Tribal Nations is provided in Section 7.1.3.

6.2.6 Socioeconomics

The Project Study Area for the socioeconomic analysis includes Sherburne, Stearns, Kandiyohi, Wright, Meeker, Chippewa, Yellow Medicine, Renville, Redwood, and Lyon Counties in central and southwestern Minnesota (refer to Figure 1.0-1). The existing demographics and socioeconomic conditions within the Project Study Area are reported based on data from the U.S. Census Bureau's 2020 Decennial Census and 2017-2021 American Community Survey 5-Year Estimates. Data is reported at the census tract and county level to characterize the socioeconomic conditions along the route options and at the state level for the purpose of comparison.

The 10 counties in the Project Study Area have very small populations compared to the State of Minnesota as a whole, comprising less than 10 percent (9.5 percent) of the state's total population. Minnesota experienced a population change of 7.1 percent between the 2010 Decennial Census and the 2020 Decennial Census. At the county level, change in population ranged from 11.8 percent growth in Wright County to 9.6 percent decline in Yellow Medicine County. Population density is greatest in the northeastern portion of the Project Study Area (Sherburne, Stearns, and Wright Counties) but overall population density declines significantly as the Project moves southwest, further away from metropolitan areas.

In the State of Minnesota, the top three industries in terms of employment are educational services, and health care and social assistance at 25.6 percent, manufacturing at 13.4 percent, and retail trade at 10.8 percent. In three of the 10 counties in the Project Study Area, the top three industries by employment are the same as the state. In seven of the 10 counties in the Project Study Area, the top three industries by employment include combinations of agriculture, forestry, fishing, and hunting, and mining; arts, entertainment, and recreation, and accommodation and food service; construction; educational, health and social services; finance and insurance, and real estate and rental and leasing; manufacturing; retail trade; and transportation and warehousing, and utilities.

Median incomes in the Project Study Area range from $59,051 in Chippewa County to $94,276 in Wright County. Generally, the counties in the Project Study Area had a median income lower than the State of Minnesota, which has a median income of $77,705. Sherburne and Wright Counties have a higher median income than the State of Minnesota at $92,374 and $94,276, respectively. The unemployment rate in the Project Study Area ranges from 1.3 percent in Redwood County to 3.4 percent in Chippewa and Stearns Counties. Chippewa and Stearns Counties have an unemployment rate higher than the State of Minnesota (2.8 percent). Persons in poverty in the Project Study Area ranges from 4.9 percent in Wright County to 12.8 percent in Stearns County. Seven out of the 10 counties within the Project Study Area have a percentage of persons in poverty higher than that of the State of Minnesota (9.2 percent). Table 6.2.6-1 includes population, income, and employment information for the counties and census tracts in the Project Study Area.

A large majority of the population in the Project Study Area identifies as White only, not Hispanic or Latino. The percentage of total minority residents is generally lower than the state level of 21.7 percent in the Project Study Area, except in Kandiyohi County (21.9 percent). Table 6.2.6-2 provides U.S. Census Bureau data about race and ethnicity in the Project Study Area.

Table 6.2.6-1 Demographic Information in the Project Study Area								
State, County, Census Tract[1]	Route Option	Population Census April 1, 2020[2]	Percent Population Change[2, 3]	Population per Square Mile – 2020 [2, 4]	Median Household Income (2021 U.S. $)[2]	Unemployment Rate (%)[5]	Persons in Poverty (%)[2]	Top 3 Industries[5]
Minnesota	**Both**	**5,706,494**	**7.1**	**71.7**	**77,706**	**2.8**	**9.2**	**E, M, R**
Sherburne County	**Both**	**97,183**	**8.9**	**224.5**	**92,374**	**2.0**	**5.0**	**E, M, C**
Census Tract 303.02	Both	3,227	NA	NA	89,352	2.3	3.8	E, C, M
Census Tract 304.07	Both	4,366	NA	NA	81,923	0.3	6.4	E, M, Ar
Census Tract 304.08	Both	5,581	NA	NA	121,181	4.6	1.0	E, R, F
Stearns County	**Both**	**158,292**	**4.8**	**117.9**	**68,212**	**3.4**	**12.8**	**E, M, R**
Census Tract 112.01	Both	3,192	NA	NA	87,614	2.7	4.1	E, Ag, M
Census Tract 112.02	Both	3,220	NA	NA	83,993	3.3	9.5	E, C, M
Census Tract 114	Blue	5,034	9.8	NA	77,539	4.0	10.4	E, M, R
Wright County	**Purple**	**141,337**	**11.8**	**213.8**	**94,276**	**1.8**	**4.9**	**E, M, R**
Census Tract 1003	Purple	5,849	8.1	NA	91,419	1.2	4.8	E, M, R
Kandiyohi County	**Both**	**43,732**	**3.4**	**54.8**	**67,798**	**2.3**	**11.0**	**E, R, M**
Census Tract 7801	Purple	2,639	2.2	NA	81,813	1.3	3.5	E, M, C
Census Tract 7804	Purple	3,654	0.8	NA	77,083	1.0	5.5	E, R, M
Census Tract 7806	Purple	5,238	2.7	NA	88,640	1.4	7.8	E, M, R
Census Tract 7811	Both	2,691	-2.3	NA	67,917	4.9	6.5	E, M, R
Census Tract 7812	Purple	2,907	0.7	NA	69,573	1.2	8.5	E, M, Ag
Meeker County	**Both**	**23,400**	**0.4**	**38.5**	**67,099**	**1.5**	**7.7**	**E, M, C**
Census Tract 5602	Both	5,164	2.1	NA	79,688	1.3	4.6	E, M, C
Census Tract 5605	Both	3,214	-1.7	NA	75,435	2.0	6.2	E, M, R
Census Tract 5606	Both	2,973	1.1	NA	62,422	1.6	15.1	E, M, R
Chippewa County	**Purple**	**12,598**	**1.2**	**21.7**	**59,051**	**3.4**	**11.3**	**E, M, R**
Census Tract 9503	Purple	2,047	-0.4	NA	58,182	5.8	11.7	E, R, M
Census Tract 9504	Purple	2,344	4.5	NA	60,438	1.9	7.1	E, M, Ag

Table 6.2.6-1 Demographic Information in the Project Study Area								
State, County, Census Tract[1]	Route Option	Population Census April 1, 2020[2]	Percent Population Change[2, 3]	Population per Square Mile – 2020 [2, 4]	Median Household Income (2021 U.S. $)[2]	Unemployment Rate (%)[5]	Persons in Poverty (%)[2]	Top 3 Industries[5]
Renville County	**Both**	**14,723**	**-6.8**	**15.0**	**61,233**	**2.1**	**9.7**	**E, M, Ag**
Census Tract 7901	Blue	2,614	NA	NA	56,970	1.3	7.7	M, E, Ag
Census Tract 7902	Blue	1,821	-7.5	NA	67,222	2.2	6.2	E, Ag, T
Census Tract 7903	Purple	1,823	-5.4	NA	70,179	1.2	7.4	E, Ag, C
Census Tract 7904	Blue	2,642	-3.3	NA	68,203	1.9	11.8	M, E, Ag
Census Tract 7906	Blue	2,737	-5.9	NA	56,607	2.7	10.5	E, Ag, M
Yellow Medicine County	**Purple**	**9,528**	**-9.6**	**12.6**	**65,014**	**2.2**	**9.9**	**E, Ag, M**
Census Tract 9701	Purple	2,999	-12.4	NA	66,528	2.4	11.5	E, Ar, M
Census Tract 9704	Purple	1,865	-8.8	NA	73,000	2.7	10.2	M, E, R
Redwood County	**Blue**	**15,425**	**-4.1**	**17.6**	**59,638**	**1.3**	**9.8**	**E, M, Ag**
Census Tract 7501	Blue	2,830	1.7	NA	60,417	1.3	7.3	E, Ag, Ar
Census Tract 7504	Blue	2,829	-6.8	NA	62,782	1.0	8.0	E, Ag, M
Census Tract 7505	Blue	2,676	-10.1	NA	61,696	1.9	10.4	E, Ag, M
Lyon County	**Both**	**25,269**	**-2.3**	**35.4**	**62,388**	**2.3**	**12.3**	**E, R, M**
Census Tract 3601	Purple	3,538	-5.3	NA	70,887	2.7	7.1	E, M, F
Census Tract 3602	Purple	3,206	-3.2	NA	79,952	1.2	5.7	E, Ag, R
Census Tract 3606	Both	2,773	-5.8	NA	70,200	2.6	6.6	E, F, Ag

[1] Census tract boundaries do not always conform to county lines and each census tract may occur in more than one county. To avoid repetition, census tracts are listed under only one county and are not repeated. For example, Census Tract 112.02 is in both Stearns and Wright Counties but is only listed under Stearns County in this table.

[2] State and County data: U.S. Census Bureau, 2021; Census Tract data: U.S. Census Bureau, 2023.

[3] Percent population change is based on Population Census April 1, 2020, as compared to Population Census April 1, 2010. NA = Census tract data did not exist as part of the Population Census April 1, 2010

[4] Population per square mile only available at the county level.

Table 6.2.6-1 Demographic Information in the Project Study Area								
State, County, Census Tract[1]	Route Option	Population Census April 1, 2020[2]	Percent Population Change[2, 3]	Population per Square Mile – 2020 [2, 4]	Median Household Income (2021 U.S. $)[2]	Unemployment Rate (%)[5]	Persons in Poverty (%)[2]	Top 3 Industries[5]

[5] Industries are defined under the 2012 North American Industry Classification System and abbreviated as follows: Ag = Agriculture, Forestry, Fishing, and Hunting, and Mining; Ar = Arts, Entertainment, and Recreation, and Accommodation and Food Service; C = Construction; E = Educational, Health and Social Services; F = Finance and Insurance, and Real Estate and Rental and Leasing; M = Manufacturing; R = Retail Trade; and T = Transportation and Warehousing, and Utilities.

Table 6.2.6-2 Race and Ethnicity of the Population in the Project Study Area											
State, County, Census Block	Route Option	White Alone, Not Hispanic or Latino (%)	Black or African American Alone (%)	American Indian or Alaska Native Alone (%)	Asian Alone (%)	Native Hawaiian/ Pacific Islander Alone (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Total Minority (%)[1]	Limited English Speaking (%)
Minnesota	**Both**	**78.3**	**6.5**	**0.8**	**5.0**	**<0.1**	**0.3**	**3.4**	**5.6**	**21.7**	**4.5**
Sherburne County	**Both**	**88.9**	**2.9**	**0.3**	**1.5**	**0.0**	**0.7**	**2.9**	**2.8**	**11.1**	**1.2**
Census Tract 303.02	Both	96.8	0.8	0.0	0.1	0.0	0.0	1.0	1.3	3.2	0.6
Census Tract 304.07	Both	92.1	0.0	1.6	0.3	0.0	0.0	5.7	0.3	7.9	0.0
Census Tract 304.08	Both	98.7	0.0	0.1	0.2	0.0	0.0	0.7	0.4	1.3	0.0
Stearns County	**Both**	**84.0**	**7.4**	**0.1**	**2.0**	**<0.1**	**0.2**	**2.6**	**3.6**	**16.0**	**4.1**
Census Tract 112.01	Both	98.5	0.4	0.0	0.0	0.0	0.0	0.1	1.0	1.5	0.5
Census Tract 112.02	Both	98.1	0.0	0.0	0.3	0.0	0.5	0.3	0.7	1.9	0.3
Census Tract 114	Blue	84.8	5.5	0.0	3.5	0.0	0.0	3.3	2.9	15.2	2.1
Wright County	**Purple**	**91.0**	**1.6**	**0.2**	**1.1**	**<0.1**	**0.3**	**2.5**	**3.2**	**9.0**	**1.3**
Census Tract 1003	Purple	94.9	0.5	0.3	0.6	0.0	<0.1	2.2	1.7	5.1	0.9
Kandiyohi County	**Both**	**78.1**	**5.8**	**0.3**	**0.6**	**0.0**	**0.2**	**2.1**	**12.9**	**21.9**	**5.3**
Census Tract 7801	Purple	97.6	0.1	0.0	0.0	0.0	0.0	1.0	1.3	2.4	0.3

Table 6.2.6-2 Race and Ethnicity of the Population in the Project Study Area											
State, County, Census Block	Route Option	White Alone, Not Hispanic or Latino (%)	Black or African American Alone (%)	American Indian or Alaska Native Alone (%)	Asian Alone (%)	Native Hawaiian/ Pacific Islander Alone (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Total Minority (%)[1]	Limited English Speaking (%)
Census Tract 7804	Purple	93.2	0.8	0.0	0.0	0.0	0.0	2.4	3.6	6.8	0.3
Census Tract 7806	Purple	87.9	2.5	0.4	0.7	0.0	0.5	0.5	7.5	12.1	1.1
Census Tract 7811	Both	92.5	0.2	0.0	0.3	0.0	0.3	4.6	2.1	7.5	0.2
Census Tract 7812	Purple	91.7	0.9	0.0	0.3	0.0	0.8	3.4	3.1	8.3	0.8
Meeker County	**Both**	**93.4**	**0.4**	**0.1**	**0.2**	**0.0**	**0.1**	**1.6**	**4.2**	**6.6**	**0.8**
Census Tract 5602	Both	93.0	<0.1	0.1	0.2	0.0	0.2	2.5	3.9	7.0	0.8
Census Tract 5605	Both	96.0	0.2	0.0	0.0	0.0	0.0	1.5	2.3	4.0	0.3
Census Tract 5606	Both	91.1	2.4	0.1	0.9	0.0	0.3	1.8	3.4	8.9	2.3
Chippewa County	**Purple**	**85.9**	**1.1**	**1.6**	**1.2**	**1.4**	**0.3**	**0.6**	**7.9**	**14.1**	**5.2**
Census Tract 9503	Purple	89.2	0.0	4.2	0.0	0.0	0.0	1.1	5.5	10.8	1.0
Census Tract 9504	Purple	89.4	0.4	1.6	0.0	0.0	0.0	0.2	8.5	10.6	3.3
Renville County	**Both**	**86.6**	**0.4**	**1.0**	**0.7**	**0.0**	**0.1**	**2.0**	**9.2**	**13.4**	**1.5**
Census Tract 7901	Blue	87.3	0.4	0.5	0.2	0.0	7.5	3.2	8.5	12.7	<0.1

Table 6.2.6-2 Race and Ethnicity of the Population in the Project Study Area											
State, County, Census Block	Route Option	White Alone, Not Hispanic or Latino (%)	Black or African American Alone (%)	American Indian or Alaska Native Alone (%)	Asian Alone (%)	Native Hawaiian/ Pacific Islander Alone (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Total Minority (%)[1]	Limited English Speaking (%)
Census Tract 7902	Blue	97.1	0.9	0.0	0.0	0.0	0.1	0.1	1.8	2.9	0.3
Census Tract 7903	Purple	95.9	0.0	0.5	0.7	0.0	0.1	1.3	1.5	4.1	0.9
Census Tract 7904	Blue	83.1	0.4	1.6	0.5	0.0	0.4	1.9	12.1	16.9	2.0
Census Tract 7906	Blue	80.9	0.6	1.8	2.2	0.0	0.3	3.1	11.2	19.1	1.3
Yellow Medicine County	**Purple**	**89.0**	**0.7**	**2.3**	**0.5**	**0.0**	**<0.1**	**2.6**	**4.9**	**11.0**	**2.1**
Census Tract 9701	Purple	85.8	1.8	6.1	0.1	0.0	0.0	4.3	1.9	14.2	0.7
Census Tract 9704	Purple	84.3	0.6	0.5	1.1	0.0	0.0	2.0	11.5	15.7	3.2
Redwood County	**Blue**	**86.2**	**0.6**	**3.5**	**2.4**	**0.0**	**0.1**	**3.3**	**3.8**	**13.8**	**1.6**
Census Tract 7501	Blue	72.4	0.0	15.2	0.1	0.0	0.5	3.4	8.4	27.6	0.3
Census Tract 7504	Blue	93.8	1.1	0.2	1.1	0.0	0.1	2.1	1.6	6.2	0.6
Census Tract 7505	Blue	82.2	2.0	0.7	11.2	0.0	0.0	2.5	1.4	17.8	5.3
Lyon County	**Both**	**82.6**	**3.0**	**0.1**	**4.9**	**<0.1**	**0.1**	**1.8**	**7.3**	**17.4**	**5.1**
Census Tract 3601	Purple	94.1	0.3	0.0	0.3	0.0	0.1	0.3	5.0	5.9	1.6

Table 6.2.6-2 Race and Ethnicity of the Population in the Project Study Area											
State, County, Census Block	Route Option	White Alone, Not Hispanic or Latino (%)	Black or African American Alone (%)	American Indian or Alaska Native Alone (%)	Asian Alone (%)	Native Hawaiian/ Pacific Islander Alone (%)	Some Other Race Alone (%)	Two or More Races (%)	Hispanic or Latino (%)	Total Minority (%)[1]	Limited English Speaking (%)
Census Tract 3602	Purple	88.3	0.8	<0.1	0.4	0.1	0.0	1.4	9.0	11.7	1.4
Census Tract 3606	Both	95.3	0.1	0.0	0.5	0.0	0.2	1.5	2.4	4.7	0.7

[1] Total minority percentage equals the total population minus the percentage of white alone, not Hispanic or Latino.

Source: U.S. Census Bureau, 2021

6.2.6.1 Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact the socioeconomic conditions of an area in the short term through an influx of non-local personnel, creation of construction jobs, construction material and other purchases from local businesses, and expenditures on temporary housing for non-local personnel. In the long term, transmission line and substation projects may provide beneficial impacts to the local tax base in the form of revenues from property taxes paid. Additionally, permanent job creation or relocation of project personnel to the area for operation of a transmission line or substation project could affect area demographics.

Construction of the transmission line will employ approximately 150 to 210 construction workers and construction of the substations will employ approximately 60 construction workers. The construction workforce will consist primarily of union labor personnel to complete construction activities. The current (2023$) combined wage and benefits package ranges from $46 to $180 per hour depending on the job type (e.g., foreman, apprentice, equipment operator). These are indicative of the wages and benefits which will be paid on the Project. Actual wages to be paid during the timeframe of this Project are subject to negotiations between union trades and have not yet been established.

The Project will also create new local job opportunities for various trade professionals that live and work in the area and it is typical to advertise locally to fill required construction positions. Opportunity exists for sub-contracting to local contractors for gravel, fill, and civil work. Additional personal income will also be generated by circulation and recirculation of dollars paid out by the Project as business expenditures and state and local taxes.

Construction and operation of the proposed Project would not directly result in a change in the population size or demographics of the counties in the Project Study Area. Construction would occur over approximately 24 to 27 months with workers likely commuting to the Project Study Area on a daily or weekly basis instead of relocating to the area. The influx of construction personnel to the Project Study Area may result in a temporary increase in the need for temporary housing, but any increase would be spread out over the length of the Project and would not be expected to affect the availability of rental housing or temporary lodging (e.g., hotels, motels, campgrounds) in any one location. The construction and operation of either route option is not anticipated to create or remove jobs in the Project Study Area over the long-term or result in the permanent relocation of individuals to or from the area.

The presence of additional workers and increased employment would result in a slight increase in retail sales in the Project Study Area due to purchases of lodging, food, fuel,

construction materials (lumber, concrete, aggregate), and other merchandise. This increase in purchases in the Project Study Area, however, would likely be easily accommodated by current retail staffing. No additional permanent staff are expected for transmission line or substation operations and maintenance. Therefore, the transmission line is not expected to change population trends, economic indicators, or employment over the long-term.

Generation enabled by the Project would help Xcel Energy to acquire necessary capacity and energy resources, and interconnect thousands of MWs of new renewable energy in southern and southwestern Minnesota.

6.2.7 Environmental Justice

According to the U.S. Environmental Protection Agency (EPA) and the MPCA, environmental justice is the 'fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies' (EPA, 2023a; MPCA, 2023). Environmental justice involves a responsibility by local, state, and federal governments to consider the potential impacts of official actions and to avoid actions that disproportionately affect historically disadvantaged groups such as people of color, low-income, and indigenous communities.

The percentage of people of color in relation to the overall population of an area is one of the factors used to identify communities with environmental justice concerns. Indigenous groups and federally recognized Indian reservations are defined by EPA and MPCA as communities with environmental justice concerns. Income considerations for identifying communities with environmental justice concern typically focus on the portion of the population that is living below the federal poverty level; however, agencies may use a threshold that exceeds the poverty level as an indicator of low-income communities (e.g., 185 percent of the federal poverty level).

Although not directly applicable to route permit applications, for other purposes, Minn. Statutes § 216B.1691, subd. 1(e) defines areas with environmental justice concerns in Minnesota:

> (e) "Environmental justice area" means 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 of the area's total population is nonwhite;
>
> (2) 35 percent or more of households in the area have an income that is at or below 200 percent of the federal poverty level;

(3) 40 percent or more of residents over the age of five have limited English proficiency; or

(4) the area is located within Indian country, as defined in United State Code, title 18, section 1151.

Tables 6.2.6-1 and 6.2.6-2 includes poverty, race and ethnicity, and limited English proficiency data for counties and census tracts within the route widths. The most recently available data, 2021 U.S. Census American Community Survey data, was used to determine the presence or absence of environmental justice areas.

A discussion of census tract-level information for the Purple and Blue Routes, along with an assessment of whether areas of environmental justice concern are present within the route options, is provided below.

6.2.7.1 Purple Route

Census tracts crossed by the Purple Route were evaluated for the presence of environmental justice areas. No census tracts crossed by the Purple Route meet the Minn. Statutes § 216B.1691, Subd. 1(e) definition of an environmental justice area. No census tracts crossed by the Purple Route have 40 percent or more of a nonwhite population, 35 percent or more households in the area with an income that is at or below 200 percent of the federal poverty line, or 40 percent or more of residents over the age of five have limited English language proficiency. Additionally, no census tract crossed by the Purple Route is within Indian country, as defined in United State Code, title 18, section 1151.

6.2.7.2 Blue Route

Census tracts crossed by the Blue Route were evaluated for the presence of environmental justice areas. No census tracts crossed by the Blue Route meet the Minn. Statutes § 216B.1691, Subd. 1(e) definition of an environmental justice area. No census tracts crossed by the Blue Route have 40 percent or more of a nonwhite population, 35 percent or more households in the area with an income that is at or below 200 percent of the federal poverty line, or 40 percent or more of residents over the age of five have limited English proficiency. Additionally, no census tract crossed by the Purple Route is within Indian country, as defined in United State Code, title 18, section 1151.

6.2.7.3 Impacts and Mitigation – All Routes

Review for the presence of areas of environmental justice concern indicates that no such areas exist within either route option. Therefore, disproportionate impacts on areas of environmental justice concern are not anticipated from the Project and no mitigation measures specific to environmental justice communities are proposed.

6.2.8 Recreation

There are many recreational opportunities in the Project Study Area. Recreational opportunities at public lands including MNDNR WMAs, AMAs, and State Water Trails, USFWS WPAs, county parks, and golf courses (refer to Figure 6.2.8-1). Each of these public lands offers many recreation opportunities that attract residents and tourists.

More specifically, WMAs are managed to provide wildlife habitat, improve wildlife production, and provide public hunting and trapping opportunities. These MNDNR lands were acquired and developed primarily with hunting license fees. WPAs are managed by the USFWS to protect breeding, forage, shelter, and migratory habitat for waterfowl or wading birds, such as ducks, geese, herons, and egrets. WPAs provide opportunities for viewing wildlife and intact ecosystems, as well as fishing, hunting, and trapping. AMAs are designated to protect, develop, and manage aquatic systems that are critical for fish and other aquatic life. The MNDNR acquires and maintains the AMAs for angling and nonmotorized recreation. State Water Trails provide opportunities for public boating, kayaking, canoeing, and camping. Wild and Scenic Rivers are managed by the MNDNR to preserve the qualities that made the river eligible for Wild and Scenic River designation while still allowing recreational use of the river for activities like canoeing, kayaking, and fishing (MNDNR, 2023c). Scenic byways are public roadways located in areas of regionally significant scenic, natural, recreational, cultural, historic, or archaeological resources (MNDOT, 2023a). Table 6.2.8-1 includes the recreational opportunities within the right-of-way of the Purple and Blue Routes.

Table 6.2.8-1 Summary of Impacts of the Route Options on Recreation

Resource	Purple Route	Blue Route
Crossed by 150-foot Right-of-Way		
WMAs	0	0
WPAs	0	0
AMAs	0	0
Private Game Refuges	2	3
Wild and Scenic Rivers	3	3
State Water Trails	4	4

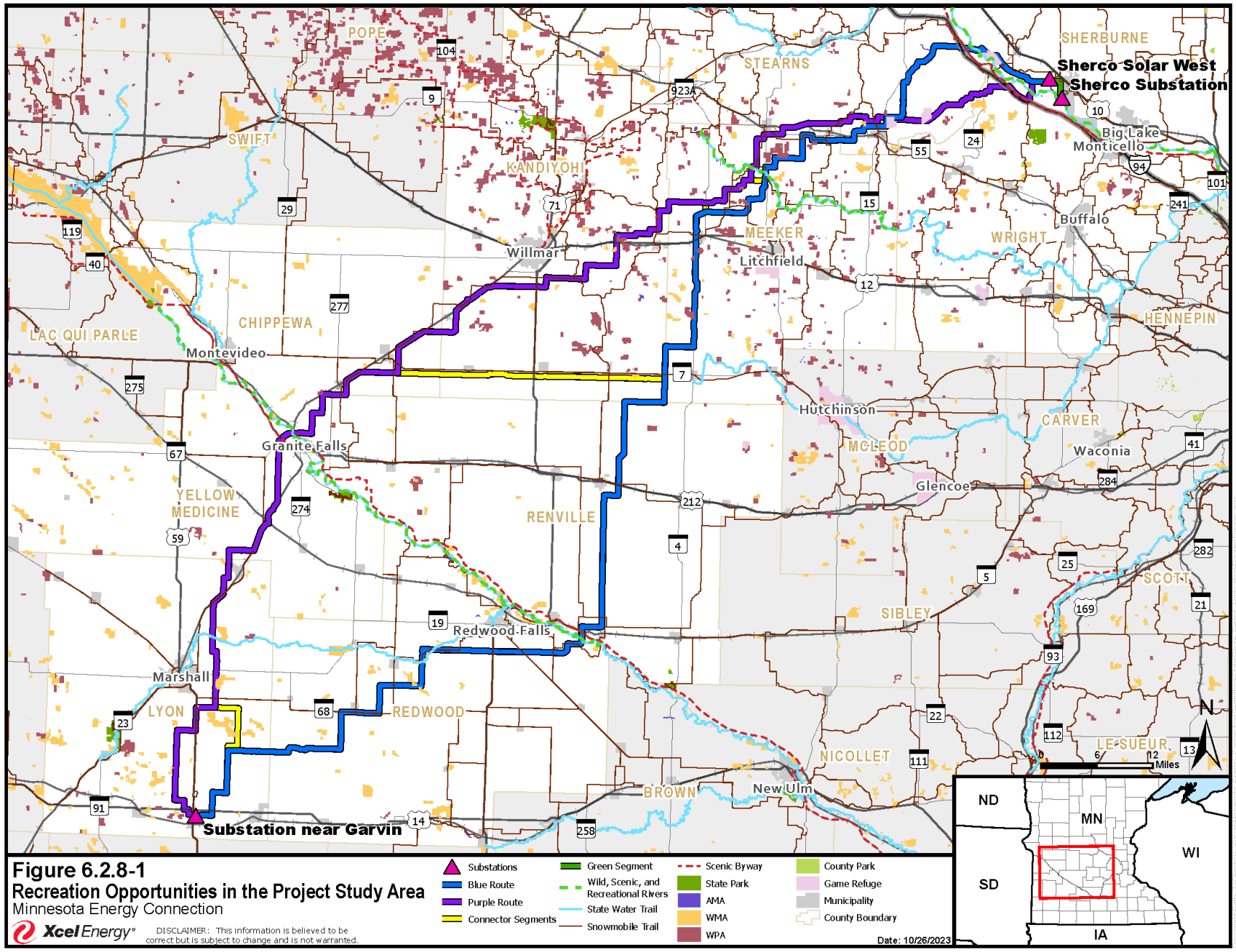
Table 6.2.8-1 Summary of Impacts of the Route Options on Recreation		
Resource	**Purple Route**	**Blue Route**
Snowmobile Trails	7	6
National Scenic Byways	2	2
State Parks	0	0
County Parks	0	0
Golf Courses	0	0

6.2.8.1 Purple Route

The following WMAs are within the route width of the Purple Route but are not proposed to be crossed by the 150-foot right-of-way of the Application alignment: Alice Hamm WMA, Atwater WMA, and the Clifton WMA. Three other WMAs are near the Purple Route in Lyon County: The Rolling Hills WMA, Meadow Creek WMA, and the White Prairie WMA. The Rolling Hills WMA is adjacent to the Clifton WMA, on the north side of 270th Street. This WMA is directly adjacent to the Purple Route, but the route width presented in this Application avoids this WMA. The Meadow Creek WMA is adjacent to the route width of the Purple Route, on the south side of Meadow Creek, but the route width avoids the WMA. The White Prairie WMA is also adjacent to the Purple Route where is crosses U.S. Highway 59, but the route width avoids this WMA, as well.

The following WPAs are within the route width of the Purple Route but are not proposed to be crossed by the 150-foot right-of-way of the Application alignment: the Meeker County WPA, the Kandiyohi WPA, and the Chippewa County WPA.

No AMAs are within the Purple Route.


Sherco Solar West
Sherco Substation
Substation near Garvin
POPE
SWIFT
KANDIYOHI
STEARNS
SHERBURNE
Big Lake
Monticello
Buffalo
WRIGHT
MEEKER
Litchfield
Willmar
CHIPPEWA
LAC QUI PARLE
Montevideo
HENNEPIN
Hutchinson
CARVER
Waconia
MCLEOD
Glencoe
Granite Falls
YELLOW MEDICINE
RENVILLE
SCOTT
SIBLEY
Redwood Falls
Marshall
LYON
REDWOOD
NICOLLET
LE SUEUR
BROWN
New Ulm
0 6 12 Miles
N
ND
MN
SD
WI
IA
Figure 6.2.8-1
Recreation Opportunities in the Project Study Area
Minnesota Energy Connection
Xcel Energy
DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.
Substations
Blue Route
Purple Route
Connector Segments
Green Segment
Wild, Scenic, and Recreational Rivers
State Water Trail
Snowmobile Trail
Scenic Byway
State Park
AMA
WMA
WPA
County Park
Game Refuge
Municipality
County Boundary
Date: 10/26/2023

Two private Game Refuges are crossed by the 150-foot right-of-way of the Purple Route in Stearns County: Laura Lake Game Refuge and School Section Lake Game Refuge. The Purple Route parallels and eventually crosses the Laura Lake Game Refuge as the Application alignment travels along County Highway 45, east of County Road 7. This refuge was established on private land surrounding Laura Lake, which is about 0.2 mile north of the Application alignment at the nearest point. Most of the area where the Purple Route crosses the game refuge appears to be actively cultivated land, based on review of aerial imagery. The School Section Lake Game Refuge is located on private land surrounding School Section Lake. The Purple Route crosses the northernmost portion of the refuge as the Application alignment travels along the north side of 150th Street toward State Highway 15; the Application alignment is on the opposite side of 150th Street from the refuge. The portion of the refuge that is within the 150-foot right-of-way of the Purple Route consists of road right-of-way and actively cultivated land.

The Purple Route would cross four State Water Trails: the Mississippi River, Minnesota River, North Fork of the Crow River, and Redwood River. The Mississippi River, Minnesota River, and the North Fork of the Crow River are also Wild and Scenic Rivers with the designation of Recreational where the Purple Route crosses these features.

The 150-foot right-of-way of the Purple Route will cross and/or parallel seven snowmobile trails: Sherburne County Snowmobile Trails, Stearns County Snowmobile Trails, Wright County Snowmobile Trails, Meeker County Trails, Glacial Lakes Trail, Cross County Trail Blazer Trails, and Lyon County Trail. Each snowmobile trail crossed by the Purple Route would be crossed multiple times. Snowmobile trails are generally located within the right-of-way of public roadways or along established trails within designated public lands in each county crossed by the Purple Route.

The Purple Route would cross two scenic byways: Great River Road and the Minnesota River Valley Scenic Byway. Additional details about these scenic byways and a discussion of potential impacts from the Project are provided in Section 6.2.4.

No state parks, county parks, or golf courses are crossed by the Purple Route.

Public recreation areas are not present within the areas where additional route width is requested for the Purple Route to allow for siting of the proposed substations.

6.2.8.2 Blue Route

The following WMAs are within the route width of the Blue Route but are not proposed to be crossed by the 150-foot right-of-way of the Application alignment: the Alice Hamm WMA and the Daub's Lake WMA.

The Meeker County WPA is within the 1,000-foot width of the Blue Route but is not within the 150-foot right-of-way of the Application alignment.

No AMAs are within the Blue Route.

The Blue Route also crosses the School Section Lake Game Refuge. The Purple and Blue Routes share the same alignment in this area and as such, the description provided for the Purple Route also applies to the Blue Route. The Blue Route also crosses the Clear Lake Game Refuge in Sherburne County between River Road Southeast and the Mississippi River. Based on review of aerial imagery, the existing land uses crossed by the 150-foot right-of-way of the Blue Route in this game refuge are a combination of row crop agriculture, existing solar farm, shelterbelts, sparse forested areas, open water, and associated wetlands.

The Blue Route would cross the same four State Water Trails crossed by the Purple Route: the Mississippi River, Minnesota River, North Fork of the Crow River, and the Redwood River, but in different locations. The Blue Route would also cross the same Wild and Scenic Rivers that are crossed by the Purple Route: the Mississippi River, Minnesota River, and the North Fork of the Crow River. The North Fork of the Crow River is designated as Recreational where the Blue Route crosses; however, the Mississippi and Minnesota rivers are designated as Scenic where the Blue Route crosses.

The Blue Route will cross and/or parallel six snowmobile trails: Sherburne County Snowmobile Trails, Stearns County Snowmobile Trails, Meeker County Trails, Glacial Lakes Trail, Renville County Drift Runner Trails, and Redwood County Trails. Each snowmobile trail crossed by the Blue Route would be crossed multiple times. Snowmobile trails are generally located within the right-of-way of public roadways or along established trails within designated public lands in each county crossed by the Blue Route.

The Blue Route would cross two scenic byways: Great River Road and the Minnesota River Valley Scenic Byway. Additional details about these scenic byways and a discussion of potential impacts from the Project are provided in Section 6.2.4.

No state parks, county parks, or golf courses are crossed by the Blue Route.

Public recreation areas are not present within the areas where additional route width is requested for the Blue Route to allow for siting of the proposed substations.

6.2.8.3 Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact public use and enjoyment of recreation areas. Short-term increases in noise and dust during construction, aesthetic changes, and impeding access to public recreation areas could impact public use and enjoyment of these resources.

The Applicant has incorporated MNDNR input into the design of the route options presented in this Application to avoid or minimize impacts on public recreation lands in the Project Study Area. The crossings included in this Application reflect MNDNR comments on paralleling existing infrastructure at Wild and Scenic River crossings and reducing impacts to sensitive areas such as WMAs (refer to Section 7.1.4.2). The Applicant will continue to work with the MNDNR to avoid and minimize impacts on recreational resources under MNDNR's jurisdiction.

Construction of the Project is not anticipated to permanently impact available recreational opportunities. Impacts to recreation including increases in noise and dust would be limited to the period of Project construction, which will be temporary and isolated to specific areas throughout the Project route. Construction of the Project is not anticipated to interfere with public access to recreation areas. If the potential for interference is identified, this also would be temporary and limited to the period of active construction and the Applicant would work with the owner or managing agency of public recreation areas to minimize disruption to the extent practicable.

Public recreation areas are not present with the potential substation siting areas along the Purple or Blue Routes; therefore, no impacts to public recreation are anticipated from construction or operation of the substations.

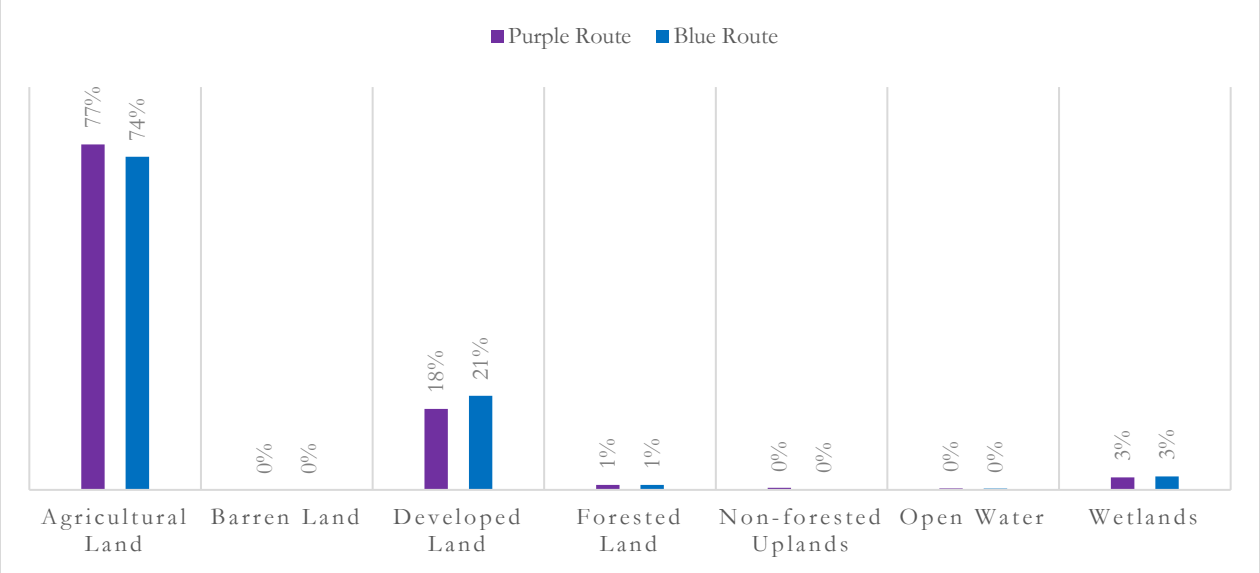
6.2.9 Land Use and Zoning

The northern portion of both routes pass through areas north and south of the Mississippi River in Sherburne, Stearns, and Wright Counties that are more densely populated with residential and commercial developments. After crossing Interstate 94, which loosely parallels the Mississippi River in the Project Study Area, the landscape becomes more rural as the route options continue to the southwest toward Lyon County and farmsteads, agricultural fields, and agricultural support facilities are more prevalent.

6.2.9.1 Land Use/Land Cover

The Applicant reviewed information available from the U.S. Geological Survey (USGS) National Land Cover Database (NLCD) to characterize existing land cover and uses along the route options (Dewitz and USGS, 2021). The primary land cover type crossed by the route options is agricultural, but some developed areas, wetlands, forested land, non-forested upland, barren land, and open water are also present along the Purple and Blue Routes. Figure 6.2.9-1 presents the land cover/use categories crossed by the proposed rights-of-way associated with both route options.

Figure 6.2.9-1 Land Cover Types within the 150-foot Rights-of-Way of the Application Alignments



Source: Dewitz and USGS, 2021

Purple Route

Within the Purple Route, approximately 77 percent of the 150-foot right-of-way consists of agricultural land (Figure 6.2.9-1). Non-agricultural areas crossed by the 150-foot right-of-way include developed land (18 percent), wetlands (3 percent), forested land (1 percent), and less than one percent of the following NLCD land use/cover categories: non-forested uplands, open water, and barren lands.

Existing land uses in the substation siting areas for the Purple Route are predominantly agricultural, with smaller areas of developed land present along roadways, as shown on the detailed routing maps in Appendix C.

Typical crops grown in agricultural areas along the Purple Route include corn, soybeans, and forage crops (e.g., hay and green chop; USDA, 2017a). A more detailed discussion

of the existing agricultural economy near the Purple Route is presented in Section 6.3.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.5.6.

Blue Route

Within the Blue Route, approximately 74 percent of the 150-foot right-of-way consists of agricultural land (Figure 6.2.9-1). Non-agricultural areas crossed by the 150-foot right-of-way include developed land (21 percent), wetlands (3 percent), forested land (1 percent), and less than one percent of the following NLCD land use/cover categories: non-forested uplands, open water, and barren lands.

Existing land uses in the substation siting areas for the Blue Route are predominantly agricultural, with smaller areas of developed land present along roadways, as shown on the detailed routing maps in Appendix C.

Typical crops grown in agricultural areas along the Blue Route include corn, soybeans, and forage crops (e.g., hay and green chop; USDA, 2017a). A more detailed discussion of the existing agricultural economy near the Blue Route is presented in Section 6.3.1 and a discussion of vegetation types found within non-agricultural areas is provided in Section 6.5.6.

6.2.9.2 Zoning

The Project is subject to Minnesota's Power Plant Siting Act (Minn. Stat. § 216E). As such, and pursuant to Minn. Stat. § 216E.10, subd. 1, a route permit issued by the Commission, "shall be the sole site or route approval required to be obtained by the utility. Such permit shall supersede and preempt all zoning, building or land use rules, regulations or ordinances promulgated by regional, county, local and special purpose government." Therefore, Xcel Energy is not required to apply to county zoning authorities for additional building or land use permits or approvals for the Project. However, zoning information is discussed here to provide information on the Projects potential impacts on existing land uses and future development.

Publicly available zoning information was reviewed for each county and municipality crossed by the route options. Table 6.2.9-1 identifies the zoning districts that would be crossed by the Application alignments of each proposed route; links to zoning source information that was available at the time of review are provided in the table.

Table 6.2.9-1 Zoning Information Along the Purple and Blue Routes			
County/Municipality	**Zoning Districts or Overlay Districts Crossed**	**Route Option**	**Links to Source Information**
Sherburne County[1]	Agricultural District	Both	Sherburne County Zoning Ordinance: https://www.co.sherburne.mn.us/651/County-Ordinances
	City Limits (Becker)		
	Recreational District	Purple	
	Industrial District	Blue	
	Orderly Annexation Zone 1		
	Orderly Annexation Zone 3		
	Scenic River District (Mississippi River)		
Becker Township	Agriculture	Both	Becker Township Zoning Ordinance: https://beckertownship.org/ordinance.html Becker Township Zoning Map: https://beckertownship.org/uploads/3/5/1/9/35198150/_official_township_zoning_map.pdf Note: Township website is undergoing revisions; zoning map may be updated.
	General Rural		
City of Becker	Power Generation	Both	City of Becker Zoning Ordinance: https://www.ci.becker.mn.us/DocumentCenter/View/388/Chapter-11-Land-Use-Regulation-Zoning City of Becker Zoning Map: https://www.ci.becker.mn.us/DocumentCenter/View/142/City-of-Becker-Zoning-Map-PDF
Stearns County[1]	Agricultural District A-40	Both	Stearns County Zoning Districts Description and links to Zoning Ordinance:
	Agricultural District A-80		

Table 6.2.9-1 Zoning Information Along the Purple and Blue Routes			
County/Municipality	**Zoning Districts or Overlay Districts Crossed**	**Route Option**	**Links to Source Information**
	Residential District R-10		https://www.stearnscountymn.gov/945/Zoning-Districts
	Commercial District	Purple	
	Protected Lake Overlay District		
	Municipality (Saint Augusta)	Blue	
	Scenic River District (Mississippi River)		
City of Saint Augusta	Agricultural District	Blue	Saint Augusta Zoning Ordinance: http://staugustamn.com/wp-content/uploads/2021/12/zoning section44.pdf Saint Augusta Zoning Map: http://staugustamn.com/city-zoning-map/
	Wetlands Overlay District (Johnson Creek)		
Wright	General Agricultural District	Purple	Wright County Zoning Ordinance: https://codelibrary.amlegal.com/codes/wrightcounty/latest/wrightco_mn/0-0-0-2574#JD_Chapter155 Wright County Beacon Interactive Map: https://beacon.schneidercorp.com/Application.aspx?App=WrightCountyMN
	Agricultural/Residential		
	Shoreland Area Overlay		
Kandiyohi County[1]	Agricultural Preservation District	Both	Kandiyohi County Zoning Ordinance: https://www.kcmn.us/departments/environmental_services/department_ordinances.php
	General Agricultural District		
	Commercial – Industrial District	Purple	
	Resource Shoreland Management District (Crow River)		

Table 6.2.9-1 Zoning Information Along the Purple and Blue Routes			
County/Municipality	**Zoning Districts or Overlay Districts Crossed**	**Route Option**	**Links to Source Information**
Meeker	Agricultural District	Both	Meeker County Zoning Ordinance: https://library.municode.com/mn/meeker_county/codes/land_development_ordinance?nodeId=LADEOR_PTIVZOOR_ART2ZODI
	North Fork Crow River Management District		
	Clearwater River Watershed District	Blue	
Chippewa County[1]	Agricultural District	Purple	Chippewa County Zoning Ordinance: https://www.co.chippewa.mn.us/176/Zoning
	Minnesota River Management District		
	Shoreland Management District (Along Hawk Creek)		
	Urban Development District		
Renville County[1]	Agricultural District	Both	Renville County Zoning Ordinance: https://cms2.revize.com/revize/renvillemn/Ordinances/Chapter%2001%20-%20Administration%20(Rev.%2003-26-2019).pdf Renville County Zoning Map: https://hub-renvilleco.hub.arcgis.com/ Renville County Zoning Maps by Township: https://www.renvillecountymn.gov/about_us/county_maps/zoning_maps_by_township.php
	Shoreland (Hawk Creek)		
	Incorporated Cities (Franklin)	Blue	

Table 6.2.9-1 Zoning Information Along the Purple and Blue Routes			
County/Municipality	**Zoning Districts or Overlay Districts Crossed**	**Route Option**	**Links to Source Information**
City of Franklin	Agriculture	Blue	City of Franklin Zoning Ordinance: https://franklinmn.us/ordinances/
Yellow Medicine County	Rural Preservation Area	Purple	Yellow Medicine County Zoning Ordinance: https://www.co.ym.mn.gov/index.asp?Type=B_BASIC&SEC={C3C725AC-DAA1-4C6C-A5D2-F07B9F71C951}&DE={E9B7F1EC-BFDB-456D-B8C3-EF50E8B75C23} Yellow Medicine County Comprehensive Plan: https://www.co.ym.mn.gov/index.asp?Type=B_BASIC&SEC={C3C725AC-DAA1-4C6C-A5D2-F07B9F71C951}&DE={4EDAEF15-423D-4233-A260-26CCB8952838}
	Minnesota River Management District		
	Floodplain Management District (Minnesota River, Yellow Medicine River)		
	Shoreland Management District (Minnesota River, Yellow Medicine River)		
Town of Hanley Falls	Industrial District	Purple	Hanley Falls Zoning Map: https://www.co.ym.mn.gov/vertical/sites/%7B9E2CF57F-0FF6-475F-BE0E-E5C421454DDB%7D/uploads/City_of_Hanley_Falls_Map.pdf
	Potential Urban Growth District		
Redwood County	Agricultural District	Blue	Redwood County Zoning Ordinance: https://redwoodcounty-mn.us/wp-content/uploads/2019/01/RedwoodCo15.pdf
	Industrial		

Table 6.2.9-1 Zoning Information Along the Purple and Blue Routes			
County/Municipality	**Zoning Districts or Overlay Districts Crossed**	**Route Option**	**Links to Source Information**
	Scenic River District (Minnesota River)		Redwood County Zoning Map: https://beacon.schneidercorp.com/Application.aspx?AppID=800&LayerID=12803&PageTypeID=1&PageID=5979
Lyon County	Agricultural District	Both	Lyon County Zoning Ordinance: https://www.lyonco.org/home/showpublisheddocument/206/637012974464430000 Lyon County Zoning Map: https://www.lyonco.org/home/showpublisheddocument/3995/637054664256770000
	Floodway District (Redwood River, Three-mile Creek, Meadow Creek, Cottonwood River)		
[1] GIS information was obtained from these counties and reviewed.			

6.2.9.3 Land Use and Zoning Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to be incompatible with existing land use patterns, local zoning requirements, and the future land use planning goals of local governments.

The route options presented in this Application were designed to predominantly parallel existing infrastructure or land divisions, such as roadways, property lines, and agricultural field edges, and avoid municipalities and other residential areas. Construction and operation of the Project is not expected to have a significant impact on land use within the counties crossed by either route option.

Transmission Line

Existing land uses along the transmission line will experience minimal, short-term impacts during the period of construction. When transmission line construction is complete, Project workspaces will be restored as described in Section 5.3, and land uses which are consistent with the safe and reliable operation of the Project will be allowed to continue as before. For a more detailed discussion of impacts and mitigation measures that will be employed in agricultural land, refer to Section 6.3.1.

The Purple and Blue Routes predominantly cross areas zoned as agricultural in all counties within the Project Study Area. Transmission lines and substations are typically

either permitted or conditional use in areas zoned as agricultural, and transmission lines and substations currently exist in these areas. Where the Purple and Blue Routes cross sensitive environmental features, such as larger perennial watercourses within the Project Study Area (e.g., Mississippi and Minnesota Rivers), shoreland and floodplain districts or overlays are crossed, as well. Such overlay districts were established to protect and enhance shoreland and floodplain areas by establishing additional restrictions and requirements for development and use of these resources. The impact discussions throughout Section 6.0 present BMPs that would be used to avoid or minimize impacts on sensitive environmental features including shoreland and floodplains (see Section 6.5.4.3, for example).

A few smaller pockets of commercial and industrial zoning areas are crossed by the route options, in particular where the route options are nearest to municipalities. Transmission lines and substations are typically either permitted or conditional use in areas zoned as industrial or commercial, as these facilities are similar to other infrastructure in industrial and commercial areas.

Based on review of the zoning information for the counties crossed by each route option, the likelihood of future residential, commercial, or industrial development within the route options is generally low; therefore, no mitigation measures are proposed. The Project is not anticipated to be inconsistent with authorized uses within the affected zoning districts crossed by either route option or be incompatible with future land use planning goals of local governments.

Substations

Construction and operation of substations would represent a long-term impact on existing land uses as these areas would be converted to developed and industrial uses. However, existing land uses adjacent to the substation sites would be allowed to continue (e.g., agricultural uses). Each substation would be located near an existing road and the Applicant will seek to site each substation in such a way that impacts on adjacent land uses are minimized to the extent practicable. The substation siting areas along the Purple and Blue Routes are predominantly zoned as agricultural and the likelihood of future residential, commercial, or industrial development within these areas is generally low; therefore, no mitigation measures are proposed.

6.2.10 Radio, Television, Cellular Phone, and GPS

6.2.10.1 Radio

There are numerous Frequency Modulation and Amplitude Modulation (FM/AM) radio broadcasting stations such as KNSR (88.9 FM), KSJR (90.1 FM), KMXK (94.9 FM), KTIS (98.5 FM), KZOK (98.9 FM), KFXN (100.3 FM), KIKV (100.7 FM), KQIC (102.5 FM), KCLD (104.7 FM), WCCO (830 AM), and KTIS (900 AM). These stations operate or can be heard within the Project Study Area.

6.2.10.2 Television

There are many television channels that broadcast in the Project Study Area; these channels are received from larger cities via cable and satellite providers in larger cities such as, St. Cloud, Minneapolis, and St. Paul.

6.2.10.3 Cellular Phone

There are 90 cellular phone towers located within the Project Study Area in proximity to the Purple and Blue Routes. Several cellular phone service providers operate in the vicinity of the Purple and Blue Routes, including Metro PCS and Cricket Wireless. Larger carriers such as Verizon Wireless, T-Mobile, and AT&T, offer service in the area.

6.2.10.4 GPS

GPS applications are important components of daily life, used in aviation, vehicle navigation, surveying, and agricultural activities. GPS equipment relies on satellites and typically mobile receiver equipment to provide locational information for navigation between endpoints, as well as geographic orientation for farm and other equipment. GPS equipment is likely used throughout the Project Study Area.

6.2.10.5 Radio, Television, Cellular Phone, and GPS Impacts and Mitigation - All Routes

The location of existing radio, television, cellular phone, and GPS systems is one of the factors to be considered when siting a transmission line or substation. Routing of transmission lines and siting of substations considers potential effects on existing radio, television, cellular phone, and GPS systems to avoid frequency disruptions.

No impact on radio, television, cellular phones, or GPS units are expected from construction or operation of the Project. Transmission lines operate at a power frequency of 60 Hz (cycles per second). Corona, as well as spark discharge, from

transmission line conductors can generate electromagnetic "noise" at the same frequencies that some radio, television, cellular, and GPS signals are transmitted. Corona is the manifestation of energy loss through the line, and this energy loss can produce sound, such as buzzing or crackling. This noise can be greater in rainy or foggy conditions. Electromagnetic noise, which typically occurs from about 0.1 to 50 megahertz (MHz), can interfere with the reception of these signals, depending on the frequency and overall strength of the radio and television signal.

AM radio frequencies are most commonly affected by corona-generated noise. Interference from a spark discharge source can be found and corrected. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side. If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations previously providing good reception can be restored by appropriate modification of (or addition to) the receiving antenna system.

Television broadcast frequencies are typically high enough that they are not affected by corona-generated noise. In particular, digital and satellite television transmissions are not affected by corona-generated noise because they are dependent on packets of binary information or transmitted in the Ku band of radio frequencies (12,000-18,000 MHz), respectively. Digital and satellite transmissions are more likely to be affected by multi-path reflections (shadowing) generated by nearby towers. In addition, line-of-sight interference from transmission line structures can affect satellite television transmissions. The use of shielded coaxial cable for cable television transmittals generally makes them insusceptible to interference from electromagnetic noise.

Cellular phone signals use an ultra-high frequency, generally around 900 MHz, which is significantly higher than the range of electromagnetic noise generated by transmission line conductors. GPS signals operate at a higher frequency as well, within the range of 1,225 to 1,575 MHz. Because both cellular phone signals and GPS operate at frequencies outside the range of electromagnetic noise generated by transmission line conductors, the risk of interference is negligible.

Operation of the substations is not expected to interfere with radio, television, cellular phones, or GPS units in the Project Study Area.

6.2.11 Transportation

6.2.11.1 Purple Route

Roadways

The main arterial roads crossed by the Purple Route are shown in Table 6.2.11-1. Multiple paved county roads exist within the Project Study Area and are crossed by the Purple Route as well, along with numerous other paved and unpaved public roads.

Traffic volumes are relatively low on most roads crossed by the Purple Route, given the rural nature of the area (refer to Table 6.2.11-1). Annual Average Daily Traffic (AADT) rates are highest in the northeastern portion of the Purple Route and lower in outlying areas. Interstate 94 sustains the largest volume of traffic in the Project Study Area where the Purple Route crosses it, with an AADT rate of 41,134 vehicles, followed by Highway 15, Highway 23, and Highway 71.

Table 6.2.11-1 Annual Average Daily Traffic on Roads Crossed by or Parallel to the Purple Route

Road	AADT	Traffic Count Year
Interstate 94	41,134	2021
U.S. Highway 12	5,609	2022
U.S. Highway 14	1,496	2022
U.S. Highway 59	2,597	2022
U.S. Highway 212	2,639	2021
State Highway 4	1,250	2019
State Highway 7	2,039	2022
State Highway 15	6,790	2022
State Highway 19	2,607	2022
State Highway 22	1,607	2021
State Highway 23	6,409	2021
State Highway 24	5,210	2022
State Highway 55	2,712	2021
State Highway 67	1,207	2021
State Highway 71	5,786	2021
Source: MNDOT, 2023b		

No future highway projects near the Purple Route are scheduled during Project construction (MNDOT, 2023c).

Railroads

The Application alignment for the Purple Route crosses the following rail lines: the Soo Line rail line (one crossing), Burlington Northern – Santa Fe rail lines (six crossings), Twin Cities and Western rail line (two crossings), and Minnesota Prairie rail line (one crossing).

Airports and Airstrips

The Applicant reviewed publicly available GIS data available from the FAA and MNDOT, as well as recent aerial imagery, to identify public and private airports and airstrips that are within 5 miles of the Purple Route's Application alignment. There are four public airports and nine private airports or airstrips within five miles of the Purple Route. The detailed map set in Appendix C shows the location of public and private airports and airstrips within 5 miles of the Purple Route.

Leaders/Clear Lake Airport in Sherburne County is 3.1 miles north of the Application alignment. This airport is privately owned but open for public use and operates one asphalt/turf runway. Aircraft operations average 134 per week, predominantly from local general aviation traffic (Airnav.com, 2023). The Willmar Municipal Airport – John L. Rice Field is 3.5 miles north of the Application alignment in Kandiyohi County. This airport operates one asphalt runway and one turf runway that is not maintained during winter months. Aircraft operations average 49 per day, predominantly from local general aviation traffic (Airnav.com, 2023). The Granite Falls Municipal/Lenzen-Roe-Fagen Memorial Airport (Granite Falls Airport) is 2.0 miles east of the Application alignment in Yellow Medicine County. This airport operates one asphalt runway and aircraft operations average 134 per week, predominantly from local general aviation traffic (Airnav.com, 2023). The Southwest Minnesota Regional Airport - Marshall/Ryan Field is 5.0 miles west of the Application alignment in Lyon County. This airport operates two asphalt runways and aircraft operations average 63 per day, from transient general aviation, air taxi, and local general aviation traffic (Airnav.com, 2023).

The closest private airports or airstrips to the Application alignment are Pagel's Field Airport which is 1.4 west/northwest of the Application alignment in Kandiyohi County and Seven Hills Airport which is 1.8 miles north/northwest of the Application alignment near the Wright and Stearns County borders. Pagel's Field Airport is a privately owned grass airstrip located about 4.0 miles north of Atwater (Airnav.com, 2023). Information about the Seven Hills Airport could not be found on the Airnav.com or FAA websites and no signs of this airport were found during review of recent aerial imagery. This airport appears to no longer be in operation. The remaining private airports and airstrips are located between 2.3 to 5.0 miles from the Purple Route Application alignment.

The only private heliport within 5 miles of the Application alignment is at Rice Memorial Hospital in Willmar, which is located 2.8 miles northwest of the Purple Route.

Aerial crop dusting can be an important part of agricultural activities within the Project Study Area and agricultural fields crossed by the Purple Route may be subject to these activities. Crop dusting operations servicing fields crossed by existing transmission lines will have already accommodated the presence of a transmission line.

6.2.11.2 Blue Route

Roadways

The main arterial roads crossed by the Blue Route are shown in Table 6.2.11-2. Multiple paved county roads exist within the Project Study Area and are crossed by the Blue Route as well, along with numerous other paved and unpaved public roads.

Traffic volumes are relatively low on most roads crossed by the Blue Route, given the rural nature of the area (refer to Table 6.2.11-2). AADT rates are highest in the northeastern portion of the Blue Route and lower in outlying areas. Interstate 94 sustains the largest volume of traffic in the Project Study Area where the Blue Route crosses it, with an AADT rate of 38,243 vehicles, followed by Highway 24, Highway 15, and Highway 12.

Table 6.2.11-2 Annual Average Daily Traffic on Roads Crossed by or Parallel to the Blue Route

Road	AADT	Traffic Count Year
Interstate 94	38,243	2022
U.S. Highway 12	4,850	2021
U.S. Highway 14	2,080	2022
U.S. Highway 71	2,250	2019
U.S. Highway 212	2,854	2022
State Highway 4	1,250	2019
State Highway 7	2,500	2019
State Highway 15	6,790	2022
State Highway 19	2,128	2021
State Highway 22	1,415	2021
State Highway 24	9,579	2022
State Highway 55	3,993	2021
State Highway 67	2,618	2021
State Highway 68	1,066	2022
Source: MNDOT, 2023b		

One future highway project is scheduled near the Blue Route, Highway 212 – Brownton roundabout construction. The roundabout will be constructed at the intersection of Highway 212 and Highway 15, located approximately 24 miles east of the Blue Route, with construction scheduled for 2025 (MNDOT, 2023c).

Railroads

The Application alignment for the Blue Route crosses the following rail lines: Soo Line railroad (one crossing), Burlington Northern – Sante Fe railroad two crossings), Twin Cities and Western railroad (one crossing), and Minnesota Prairie railroad (one crossing).

Airports and Airstrips

Publicly available GIS data from the FAA and MNDOT, as well as review of recent aerial imagery indicates that there are three public airports and eight private airports/airstrips within 5 miles of the Blue Route. The detailed map set in Appendix C shows the location of public and private airports/airstrips within 5 miles of the Blue Route.

Leaders/Clear Lake Airport in Sherburne County is 2.6 miles northeast of the Application alignment. This airport is privately owned but open for public use and operates one asphalt/turf runway. Aircraft operations average 134 per week, predominantly from local general aviation traffic (Airnav.com, 2023). The Redwood Falls Municipal Airport is 3.2 miles north of the Application alignment in Redwood County. This airport operates one asphalt runway and one turf runway that is not maintained during winter months. Aircraft operations average 27 per day, predominantly from local general aviation traffic (Airnav.com, 2023). The Tracy Municipal Airport is 4.0 miles east/southeast of the Application alignment in Lyon County. This airport operates one asphalt runway and one turf runway that is not maintained during winter months. Aircraft operations average 58 per week, predominantly from transient general aviation traffic (Airnav.com, 2023).

Of the eight private airports/airstrips within 5 miles of the Blue Route, the nearest to the Application alignment are the Lux Strip Airport (0.3 mile north), Fuhr Flying Service Airport (0.6 mile west), and Tyler Farms (0.8 mile east). The Lux Strip Airport is a privately owned grass airstrip in Meeker County about 3.0 miles northwest of the Town of Cosmos. The Fuhr Flying Service Airport is a privately owned grass airstrip that is 1.8 miles east of Seaforth in Redwood County. Tyler Farms Airport is a privately owned airport that is 3.9 miles south of Eden Valley in Meeker County that operates two turf runways (Airnav.com, 2023). The five remaining private airports or airstrips are between 2.1 and 4.1 miles from the Application alignment.

No heliports are within 5 miles of the Blue Route.

Aerial crop dusting can be an important part of agricultural activities within the Project Study Area and agricultural fields crossed by the Blue Route may be subject to these activities. Crop dusting operations servicing fields crossed by existing transmission lines will have already accommodated the presence of a transmission line.

6.2.11.3 Transportation Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact existing transportation systems during the period of construction due to increased traffic volumes from construction vehicles and material/equipment delivery along roadways in a project area. Additionally, road closures during active construction could impact the travelling public. Construction of transmission lines across existing railroads could impact rail service if closures are needed when stringing conductors between support structures. Impacts to public airports and private airstrips are also possible from transmission line projects. If conflicts are identified, impacts can be mitigated through coordination with the FAA, MNDOT, and private airstrip owners/operators.

Roadways

Construction activities are not expected to permanently impact transportation. Construction could temporarily increase traffic volumes from construction vehicles and material/equipment delivery along roadways within the Project Study Area; however, this increase would be temporary and return to normal conditions once construction activities are completed. Line and construction maintenance at crossing locations could also cause temporary delays if maintenance vehicles are present. To minimize overall impacts, the Applicant will limit vehicle traffic to the Project right-of-way and existing access points to the greatest extent feasible.

Temporary road or lane closures may occur during the construction process to ensure the safety of construction crews and the traveling public. While the line is constructed, the electrical conductors would be strung on support structures using a pulley system or a tensioner mounted on the back of a digger/derrick truck. At road crossings, roads or lands may be temporarily closed for safety purposes when stringing electrical conductors between support structures. These closures could range in duration from minutes to hours based on the width of the road and the complexity of the crossing. Temporary closings are not expected to have significant impacts on transportation in the area because of the generally rural nature of the area and subsequent low traffic levels on most roads. Once an aerial crossing is completed, the road would be reopened to allow normal traffic flow.

Expansion of the Sherco and Sherco Solar West Substations may result in an increase in traffic during the construction period, but traffic levels would return to normal after construction is complete. Construction of the new Terminal Substation and the Intermediate and Voltage Support Substations would likely result in an increase in traffic on local roadways from construction vehicles traveling to and from the sites. An increase in traffic in the vicinity of the substation sites would cease after these facilities are constructed and operation of the substations would not likely affect local traffic volumes. The substations would not be sited within existing road rights-of-way; however, each new substation would require a new permanent access road from public roadways to the facility.

Any occupation of state highway right-of-way requires a Utility Permit from MNDOT, per Minnesota Rule 8810.3100-3600. MNDOT has issued an Accommodation Policy that provides requirements and guidelines for utilities seeking to install facilities in and along MNDOT rights-of-way, which the Project was developed to meet. The Applicant will continue to work with MNDOT throughout the Route Permit process to ensure that the Application alignment and substation sites meet MNDOT guidelines.

As noted in Section 5.3, after the completion of construction, the Applicant will ensure that township, city, and county roads used for purposes of access during construction are returned to either the condition they were in, or better, before right-of-way clearing began. The Applicant will meet with township road supervisors, city road personnel, or county highway departments to address any issues that arise during construction with roadways to ensure the roads are adequately restored, if necessary, after construction is complete.

Railroads

The Applicant will obtain all necessary railroad crossing permits from Soo Line, Burlington Northern – Santa Fe, Twin Cities and Western, and Minnesota Prairie for their respective rail lines. The Applicant will also coordinate with the appropriate railroad personnel during construction to coordinate electrical conductor stringing over the rail line for the safety of construction personnel and rail line operations.

Expansion of the Sherco and Sherco Solar West Substations and construction and operation of the Terminal, Intermediate, and Voltage Support Substations would not affect railroads.

Airports and Airstrips

The Applicant will continue to coordinate with the FAA, MNDOT, and privately-owned airstrip operators to identify any Project-related concerns for aviation activities

as the Project progresses and more detailed design information becomes available, including specific structure locations and heights above ground.

On August 30, 2023, MNDOT provided early coordination comments on the Purple and Blue Routes. In its letter, MNDOT indicated that the Purple Route would conflict with the Granite Falls Airport's horizontal surface. MNDOT further noted that the Applicant should file Form 7460-1 with FAA to request an evaluation for the Project. MNDOT further noted that local zoning in the area surrounding the airport restricts structure heights to 150 feet. The Granite Falls Airport is approximately two miles east of the Application alignment for the Purple Route and the Purple Route does not cross the zoning district noted by MNDOT. The Applicant will file Form 7460-1 with FAA to ensure the Project will not conflict with operation of the Granite Falls Airport.

The Applicant will discuss the Project with owners of private airstrips and avoid impacts to the extent practicable. Crop dusting operations servicing fields crossed by existing transmission lines may have already been developed to accommodate the presence of a transmission line. The Applicant will inform the owners of affected private airstrips when construction will occur.

Expansion of the Sherco Solar West and Sherco Substations would not affect airports. The Applicant will site the new Terminal, Intermediate, and Voltage Support Substations in areas where these facilities would not interfere with safe operation of existing public airports and private airstrips.

Construction and operation of the Project is not expected to impact heliports operating from hospitals in Willmar. The Applicant will coordinate with the FAA for appropriate notifications associated with Project construction as necessary.

6.2.12 Electric and Magnetic Fields

"EMF" is an acronym for the terms electric and magnetic fields. For the lower frequencies associated with power lines (referred to as ELF), EMF is considered separately – electric fields and magnetic fields, measured in kilovolts per meter (kV/m) and milliGauss (mG), respectively. Electric fields are dependent on the voltage of a transmission line and magnetic fields are dependent on the current carried by a transmission line. The strength of the electric field is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 Hz (cycles per second).

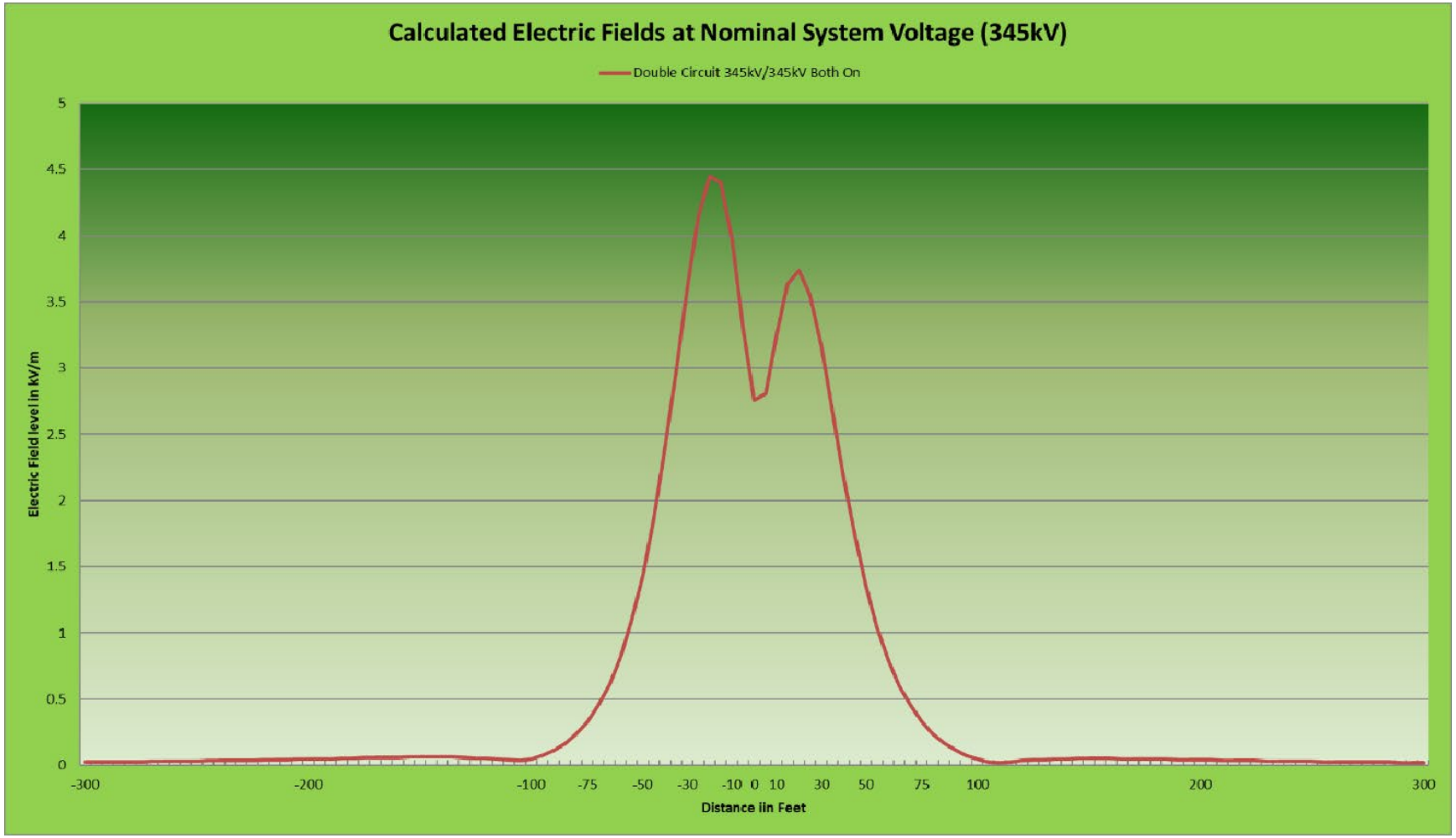
6.2.12.1 Electric Fields

There is no federal standard for transmission line electric fields. The Commission, however, has imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground.[9] The standard was designed to prevent serious hazards from shocks when touching large objects parked under alternating current transmission lines of 500 kV or greater. Figure 6.2.12-1 provides the electric fields at maximum conductor voltage for the proposed 345 kV transmission line. Maximum conductor voltage is defined as the nominal voltage plus five percent. The maximum electric field, measured at one meter (3.28 feet) above ground, associated with the Project is calculated to be 4.14 kV/m. As shown in Figure 6.2.12-1, the strength of electric fields diminishes rapidly as the distance from the conductor increases. The electric field values of all of the design options at the edge of the transmission line right-of-way and sample points beyond are shown in Table 6.2.12-1.

[9] *In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, S.D. to Hampton, Minn.,* Docket No. ET2/TL-08-1474, ORDER GRANTING ROUTE PERMIT (Sept. 14, 2010) (adopting the Administrative Law Judge's Findings of Fact, Conclusions, and Recommendation at Finding 194).

Table 6.2.12-1 Electric Field Calculations														
Structure Type	Nominal Voltage	Distance to Proposed Centerline (feet)												
		-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
345 kV/345 kV Double-Circuit Monopole	362 kV	0.2	0.05	0.04	0.33	1.44	4.14	2.76	3.5	1.36	0.33	0.05	0.04	0.02

Figure 6.2.12-1 Calculated Electric Fields (kV/m) for Proposed 345 Kilovolt Transmission Line Designs (3.28 feet above ground)



6.2.12.2 Magnetic Fields

The projected magnetic fields for different structure and conductor configurations for the Project are provided in Table 6.2.12-2 and Figure 6.2.12-2. Since magnetic fields are dependent on the current flowing on the line, magnetic fields were calculated for two different typical system conditions during the Project's first year in service (2027). These two scenarios are:

1) System Peak Energy Demand
2) System Average Energy Demand

The "System Peak Energy Demand" current flow (estimated loading of 1100 MVA), represents the current flow on the line during the peak hour of system-wide energy demand. The "System Average Energy Demand" current flow (estimated loading of 660 MVA), represents the current flow on the line during a non-peak time (winter months) when there are high levels of wind generation and the transmission system is intact (i.e., no outages).

The magnetic field values for the two scenarios were calculated at a point where the conductor is closest to the ground. The magnetic field data shows that magnetic field levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from source). In addition, since the magnetic field produced by the transmission lines is dependent on the current flow, the actual magnetic fields when the Project is placed in service will vary as the current flow on the line changes throughout the day.[10]

There are presently no Minnesota regulations pertaining to magnetic field exposure. Applicant provides information to the public, interested customers, and employees so they can make informed decisions about magnetic fields. Such information includes the availability for measurements to be conducted for customers and employees upon request.

Considerable research has been conducted since the 1970s to determine whether exposure to power-frequency (60 Hz) magnetic fields causes biological responses and health effects. Public health professionals have also investigated the possible impact of exposure to EMF on human health for the past several decades. While the general consensus is that electric fields pose no risk to humans, the question of whether

[10] Magnetic field calculations for the Project substations are not provided here because the specific physical design of a substation is required for a software package to calculate representative magnetic fields, and that level of design is not yet available for the Project substations. Magnetic fields associated with the Project's substations are anticipated to be similar to other existing 345-kV substations in Minnesota.

exposure to magnetic fields can cause biological responses or health effects continues to be debated.

Since the 1970s, a large amount of scientific research has been conducted on EMF and health. This large body of research has been reviewed by many leading public health agencies such as the U.S. National Cancer Institute, the U.S. National Institute of Environmental Health Sciences, and the World Health Organization (WHO), among others. These reviews do not show that exposure to electric power EMF causes or contributes to adverse health effects.

For example, in 2016, the U.S. National Cancer Institute summarized the research as follows:

> Numerous epidemiologic studies and comprehensive reviews of the scientific literature have evaluated possible associations between exposure to non-ionizing EMFs and risk of cancer in children (13–15). (Magnetic fields are the component of nonionizing EMFs that are usually studied in relation to their possible health effects.) Most of the research has focused on leukemia and brain tumors, the two most common cancers in children. Studies have examined associations of these cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the workplace. No consistent evidence for an association between any source of nonionizing EMF and cancer has been found. (National Cancer Institute, 2017)

Figure 6.2.12-2 Calculated Magnetic Flux density (mG) for Proposed 345 Kilovolt Transmission Line Design (3.28 feet above ground)

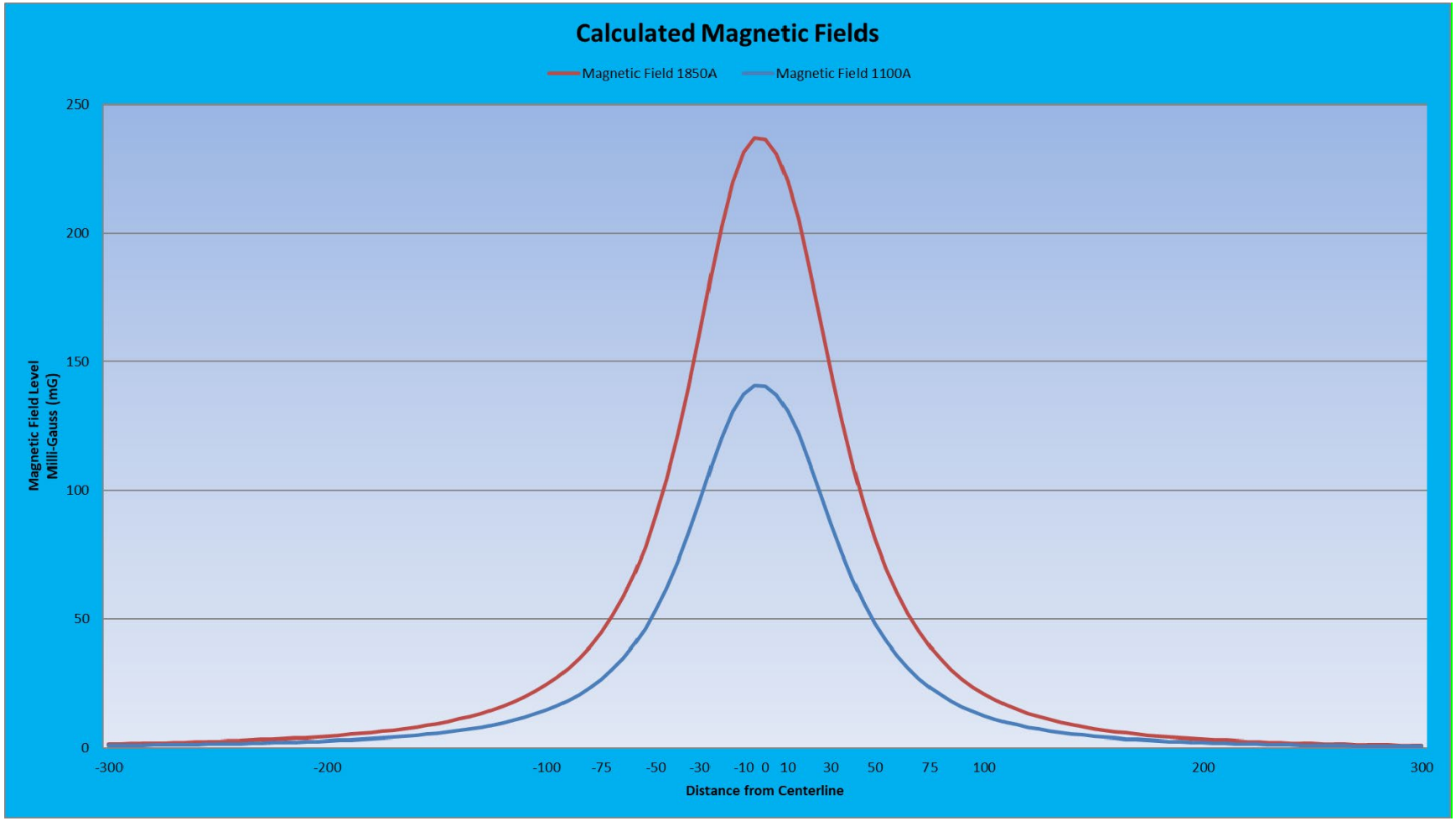


Table 6.2.12-2 Magnetic Field Calculations														
Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline (feet)											
			-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
345 kV/345 kV Double-circuit Monopole	Peak System Energy Demand (1100 MVA / 1100 MVA)	1850/1850	1.5	4.5	25	45	90	161	237	167	95	45	24	3.5	1
	High Wind Utilization (660 MVA / 660 MVA)	1100/1100	1	2.6	15	27	54	96	141	99	56	27	14	2	0.6

Wisconsin, Minnesota, and California have all conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group (Working Group) to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from high voltage transmission line EMF effects. The Working Group consisted of staff from various state agencies and published its findings in a White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options in September 2002, (Minnesota State Interagency Working Group, 2002). The report summarized the findings of the Working Group as follows:

> Research on the health effects of [MF] has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to [MF] and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between [MF] and health effects; however, many of them also concluded that there is insufficient evidence to prove that [MF] exposure is safe. (*Id* at p. 1.)

The Commission, based on the Working Group and WHO findings, has repeatedly found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects."[11]

[11] *In the Matter of the Application of Xcel Energy for a Route Permit for the Lake Yankton to Marshall Transmission Line Project in Lyon County*, Docket No. E002/TL-07-1407, FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER ISSUING A ROUTE PERMIT TO XCEL ENERGY FOR THE LAKE YANKTON TO MARSHALL TRANSMISSION PROJECT at 7-8 (Aug. 29, 2008); *see also In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET2, E015/TL-06-1624, FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER ISSUING A ROUTE PERMIT TO MINNESOTA POWER AND GREAT RIVER ENERGY FOR THE TOWER TRANSMISSION LINE PROJECT AND ASSOCIATED FACILITIES at 23 (Aug. 1, 2007) ("Currently, there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects.").

6.2.12.3 Stray Voltage and Induced Voltage

"Stray voltage" is a condition that can potentially occur on a property or on the electric service entrances to structures from distribution lines connected to these structures—not transmission lines as proposed here. The term generally describes a voltage between two objects where no voltage difference should exist. More precisely, stray voltage is a voltage that exists between the neutral wire of either the service entrance or of premise wiring and grounded objects in buildings such as barns and milking parlors. The source of stray voltage is a voltage that is developed on the grounded neutral wiring network of a building and/or the electric power distribution system.

Transmission lines do not, by themselves, create stray voltage because they do not connect directly to businesses or residences. Transmission lines, however, can induce voltage on a distribution circuit that is parallel and immediately under the transmission line. If the proposed transmission lines parallel or cross distribution lines, appropriate mitigation measures can be taken to address any induced voltages. For additional information regarding stray voltage, please see the Minnesota Stray Voltage Guide that is available online at www.minnesotastrayvoltageguide.com or contact your electric utility provider.

6.2.12.4 Farming Operations, Vehicle Use, and Metal Buildings near Power Lines

The power lines will be designed to meet or exceed minimum clearance requirements with respect to electric fencing as specified by the NESC. Nonetheless, insulated electric fences used in livestock operations can be instantly charged with an induced voltage from transmission lines. The induced charge may continuously drain to ground when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, shocks may result. The local electrical utility can provide site specific information about how to prevent possible shocks when the charger is disconnected.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements with respect to roads, driveways, cultivated fields, and grazing lands as specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

Vehicles, or any conductive body, under high voltage transmission lines will be immediately charged with an electric charge. Without a continuous grounding path, this charge can provide a nuisance shock. Such nuisance shocks are a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an

electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, the induced charge on vehicles will normally be continually flowing to ground unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground. Applicant can provide additional vehicle-specific methods for reducing the risk of nuisance shocks in vehicles.

Buildings are permitted near transmission lines but are generally discouraged within the right-of-way itself because a structure under a line may interfere with the safe operation of the transmission facilities. For example, a fire in a building within the right-of-way could damage a transmission line. The NESC establishes minimum electrical clearance zones from power lines for the safety of the general public and utilities often acquire easement rights that require clear areas in excess of these established zones. Utilities may permit encroachment into that easement for buildings and other activities when they can be deemed safe and still meet the NESC minimum requirements. Metal buildings may have unique issues due to induction concerns. For example, conductive buildings near power lines of 200 kV or greater must be properly grounded. Any person with questions about a new or existing metal structure can contact the Applicant for further information about proper grounding requirements.

6.2.12.5 Impacts and Mitigation – All Routes

No impacts to human health are anticipated as a result of electric or magnetic fields from the Project. The Project will be designed in accordance with applicable NESC standards and to keep electric fields below the 8 kV/m standard set by the Commission.

Magnetic field strength is mitigated by distance from the source (conductor) to the receptor. If the proposed transmission lines parallel or cross distribution lines, appropriate mitigation such as grounding measures can be taken to address any induced voltages. Any person with questions about a new or existing metal structure can contact the Applicant for further information about proper grounding requirements. For additional information regarding stray voltage, please see the Minnesota Stray Voltage Guide that is available online at www.minnesotastrayvoltageguide.com or contact your electric utility provider.

6.3 LAND BASED ECONOMIES

Construction and operation of transmission lines and substations have the potential to affect land-based economies through introduction of a physical, long-term presence which could prevent or otherwise limit use of the land for other purposes. The following subsections present an overview of agricultural, forestry, tourism, and mining operations in the Project Study Area and discuss how the Project may affect these industries and what measures Xcel Energy will implement to mitigate Project effects.

6.3.1 Agriculture

As described in Section 6.2.9, agricultural land is the predominant land cover type in the counties within the Project Study Area. According to the U.S. Department of Agriculture's (USDA's) 2017 Census of Agriculture, the average farm size within the Project Study Area ranges from 180 acres in Wright County to 608 acres in Renville County (Table 6.3.1-1). In general, average farm sizes in the northeastern portion of the Project Study Area are smaller than farm sizes in the southwestern portion of the Project Study Area. Areas of prime farmland follow a similar pattern with the amount of prime farmland steadily increasing as the routes travel to the southwestern portion of the Project Study Area. Agricultural statistics for the counties within the Project Study Area are summarized in Table 6.3.1-1.

The Applicant attempted to avoid specialty crops[12], organic farms[13], and center-pivot irrigation systems by reviewing publicly available data and aerial imagery during the route development process. In addition, comments received from landowners during initial public outreach were considered. No farms with specialty crops were identified within either route option. One organic farm is crossed by the Purple Route and two other organic farms are adjacent to but not crossed by the Purple Route in Stearns County. The Blue Route does not cross organic farms. Center-pivot irrigation systems occur within the Project Study Area, predominantly in the northern portion. The routes presented in this Application generally avoid center pivot irrigation by situating the transmission line alignment at the edge of fields to not disrupt operation of the irrigation system.

[12] Specialty crops are defined as "Fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)." Available online at https://www.ams.usda.gov/services/grants/scbgp/specialty-crop.

[13] Organic farms are farms that meet the criteria established under 7 CFR Part 205 and have received certification from the USDA. Available online at https://www.ecfr.gov/current/title-7/subtitle-B/chapter-I/subchapter-M/part-205?toc=1.

Table 6.3.1-1 Agricultural Statistics of Counties in the Project Study Area						
County	Route Option	Land in Farms (acres)	Average Farm Size (acres)	Percentage of Total Market Value of Agricultural Products (Crops / Livestock)	Top 3 Crops by Acreage	Top 3 Livestock Inventories by Farms
Sherburne	Both	102,544 (37% of county)	205	84% / 16%	Corn, soybeans, potatoes	Cattle, poultry, sheep and lambs
Stearns	Both	650,821 (76% of county)	221	24% / 76%	Corn, soybeans, forage	Cattle, poultry, hogs and pigs
Wright	Purple	240,651 (57% of county)	180	58% / 42%	Soybeans, corn, forage	Cattle, poultry, sheep and lambs
Kandiyohi	Both	455,854 (89% of county)	374	47% / 53%	Corn, soybeans, sugar beets	Cattle, poultry, sheep and lambs
Meeker	Both	301,439 (77% of county)	293	46% / 54%	Soybeans, corn, forage	Cattle, poultry, hogs and pigs
Chippewa	Purple	341,030 (92% of county)	547	73% / 27%	Corn, soybeans, sugar beets	Cattle, poultry, hogs and pigs
Renville	Both	624,114 (99% of county)	608	61% / 39%	Corn, soybeans, sugar beets	Cattle, hogs and pigs, sheep and lambs/poultry
Yellow Medicine	Purple	383,646 (79% of county)	450	66% / 34%	Corn, soybeans, forage	Cattle, hogs and pigs, sheep and lambs/poultry
Redwood	Blue	523,912 (93% of county)	462	58% / 42%	Corn, soybeans, forage	Cattle, hogs and pigs, poultry
Lyon	Both	395,132 (87% of county)	442	44% / 56%	Corn, soybeans, forage	Cattle, hogs and pigs, sheep and lambs
Source: USDA, 2017a						

As shown in Table 6.5.3-1 in Section 6.5.3, the Purple and Blue Routes both cross soils that are classified as "Prime Farmland" and "Farmland of Statewide Importance." Approximately 75 percent of the 150-foot right-of-way of the Purple Route is prime farmland (all categories) about 74 percent of the Blue Route right-of-way is prime farmland (all categories). About 14 percent of the Purple Route's and approximately 14 percent of the Blue Route's right-of-way is considered farmland of statewide importance. It is important to note that prime farmland soil designation is independent of current land use and soils at the proposed permanent facilities may have already been significantly modified by previous development or may not currently be used for agricultural purposes. Additional discussion of prime farmland and farmlands of statewide importance is provided in Section 6.5.3.

The CREP is an offshoot of the Conservation Reserve Program (CRP) which is a land conservation program established by the USDA and administered by the Farm Service Agency that pays farmers a yearly rental fee for agreeing to take environmentally sensitive land out of agricultural production in an effort to improve environmental health and quality (USDA, 2017b). Minnesota implemented the CREP to target state-identified, high-priority conservation issues by offering payments to farmers and agricultural landowners to retire environmentally sensitive land using the RIM Reserve Program (BWSR, 2019). Enrollment in the CRP and CREP is voluntary.

Publicly available GIS data from the National Conservation Easement Database (NCED) was reviewed to identify CREP and RIM easements within the 150-foot right-of-way of each route option. The results of this review are presented in Table 6.3.1-2.

Table 6.3.1-2 CREP and RIM Easements within the 150-foot Right-of-Way of the Route Options

Route Option	County[1]	CREP Easements (number)	RIM Easements (number)
Purple Route 150-foot Right-of-Way	Chippewa	1	1
	Yellow Medicine	2	0
	Lyon	2	0
Purple Route 150-foot Right-of-Way Total		**5**	**1**
Blue Route 150-foot Right-of-Way	Renville	1	1
	Redwood	1	3
Blue Route 150-foot Right-of-Way Total		**2**	**4**

[1] Only those counties where a CREP or RIM easement is crossed are included in this table.
Source: NCED, 2023

Information about enrollment in the CREP program is not always publicly available and individual parcel enrollment status is often identified during the easement acquisition process. For this reason, review of publicly available GIS information may not identify all CREP-enrolled parcels within the route options. Xcel Energy will work with landowners to identify additional CREP-enrolled lands after a route is chosen by the Commission.

6.3.1.1 Impacts and Mitigation – All Routes

The placement of transmission line structures in cultivated cropland has the potential to interfere with farming operations if paralleling field edges and roadways is not possible due to other routing constraints. In addition, future crop yields in actively cultivated land can be negatively affected by mixing of topsoil and subsoil, soil erosion, soil compaction from the use of heavy machinery, and the spread of noxious weeds and invasive species to areas where they previously were not present. The placement of a substation on land used for row crop cultivation would result in a permanent conversion from row crop production to industrial use for the life of a project. Interference with farming operations can negatively affect farm income.

During Project construction, temporary impacts on agricultural land could include soil compaction and rutting, soil erosion, crop disturbance, disruption of normal farming activities, and introduction of noxious weeds to areas where they previously were not present. Impacts may vary based on the season in which construction occurs. For example, during the winter impacts to crops are not anticipated because crop fields are not planted and the ground is frozen. The Applicant will implement measures to reduce soil erosion and sedimentation by installing erosion control devices during construction in accordance with the Project SWPPP and will compensate farmers for crop damage. The Applicant will use BMPs including ensuring construction mats and vehicle tires are free of soil and vegetation before arriving on site, to avoid the spread of noxious weeds and invasive species in agricultural land. Post-construction restoration efforts will include restoration of any temporary access modifications and deep plowing to remove compaction in agricultural lands. Both crop and livestock activities will be able to continue around Project facilities after construction.

While routes were developed with attention to minimizing impacts to agricultural land, permanent impacts to agricultural land will occur where structures are placed in cultivated fields. Both crop and livestock activities will be able to continue around Project facilities after construction. Structures will be placed approximately 1,000 feet apart to minimize the number of structures on farmland. Where a route follows a road, structures are typically placed approximately 9 feet into the field from the edge of the road right-of-way which minimizes impacts on agricultural land. However, where the

routes follow property and field lines, monopoles would typically be constructed on the property line and therefore not impact agricultural land.

Table 6.3.1-3 Summary of Impacts of the Route Options on Agricultural Land		
Resource	**Purple Route**	**Blue Route**
Farmland Area Comparison		
Route Length (miles)	170.6	173.9
Right-of-Way (acres)	3,100.1	3,160.8
Agricultural Land in 150-foot Right-of-Way (acres/percent))	2,393.2 / 77%	2,352.7 / 74%

The Applicant will work with individual landowners through the easement process to verify the locations of organic farms and center-pivot irrigation systems identified to date and to identify any additional specialty crops, organic farms, center-pivot irrigation systems, or CREP/RIM easements that may be affected by the Project. The Applicant will work with landowners to determine measures to avoid and minimize impacts on these agricultural resources and to avoid interfering with landowner participation in the CREP or RIM programs.

If the substations proposed as part of this Project are sited on agricultural land, construction and operation of these facilities would remove agricultural land from production. This would represent a long-term impact and result in a conversion of land use types from agricultural to developed/industrial. However, farming operations would be allowed to continue in the areas directly adjacent to the substation sites.

The Applicant has developed a Draft Agricultural Impact Mitigation Plan (AIMP; Appendix H); the Applicant will coordinate with the Minnesota Department of Agriculture (MNDOA) to finalize the AIMP for the Project. This plan will outline best practices to minimize and mitigate potential agriculture impacts including measures to protect actively cultivated agricultural fields.

6.3.2 Forestry

Minimal forested areas exist along either the Purple or Blue Routes. There are forested riparian areas at larger streams and rivers such as the Mississippi, Minnesota, Clearwater, Crow, and Redwood rivers, but these are not known to be commercial forestry operations. Additionally, there are wood lots surrounding rural farmsteads, but no state or commercial forestry operations have been identified along either route option.

6.3.2.1 Impacts and Mitigation – All Routes

The introduction of a transmission line or substation on land that is used for commercial forestry would limit the continued use of that land for the life of a project, thereby negatively impacting the income of a forestry operation. Trees are not allowed within transmission line rights-of-way due to safety concerns.

Because there are no known commercial forestry operations in the vicinity of the Purple or Blue Routes, there are no anticipated impacts to commercial forestry operations from the construction and operation of the Project.

6.3.3 Tourism

Tourism in the Project Study Area centers around outdoor recreational opportunities described in Section 6.2.8 and various festivals and activities hosted by the larger cities near the route options, like Becker, Willmar, Granite Falls, Marshall, and Redwood Falls. Outside these municipalities, residents and tourists enjoy recreational opportunities at the WMAs, WPAs, state parks, city parks, Mississippi River, Crow River, and Minnesota River State Water Trails, and snowmobile trails.

6.3.3.1 Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact tourism through aesthetic changes to the existing landscape or interruption of public access to nearby recreational and tourism opportunities.

Construction of the Project is not anticipated to affect available tourism and recreational opportunities. Any impacts to tourism from Project construction would be temporary and isolated to the route selected for the Project. Construction may require temporary safety closures in certain areas, but these are not anticipated to be frequent or of great duration. The Applicant will coordinate with the appropriate state or local management agencies for any utility crossings of public recreation lands. No permanent impacts to tourism are anticipated from the Project. Additional discussion of recreational opportunities in the Project Study Area is provided in Section 6.2.8.

6.3.4 Mining

Mining operations in the Project Study Area are infrequent and consist of sand and gravel operations that are primarily mined for local use such as making concrete for highways, roads, bridges, and buildings. These mining operations are owned either by citizens, private companies, or MNDOT. The location of mining operations near the proposed route options are shown in the detailed route maps in Appendix C.

Based on review of MNDOT's Aggregate Source Information Map (ASIS) data (MNDOT, 2023d), the following mining resources were identified within the Purple Route:

- A privately owned mining operation (ASIS ID 73164) located in T122N, R29W, Section 26, W ½, SE ¼ SE ¼, in Stearns County was identified within the route width of the Purple Route. The mining operation appears to be active based on review of aerial imagery. The main mining area is outside of the 150-foot right-of-way, but the right-of-way and the Application alignment cross the entrance to the mine.
- The Stearns Aggregate sand and gravel mining operation (ASIS ID 73191) was identified within the route width of the Purple Route in Stearns County, in T122N, R29W, Section 34, SE ¼ NE ¼. The mining operation appears to be active based on review of aerial imagery. This mining operation is on the opposite side of 93rd Avenue from the Application alignment and would not be crossed by the Project.
- A privately owned mining operation (ASIS ID 42013) was identified within the route width of the Purple Route in T111N, R41W, Section 23, NW ¼, NW ¼, in Lyon County. The mine does not appear to be active based on review of aerial imagery; the location appears to be a farmstead that is just south of White Prairie WMA.

The following mining resources were identified within the Blue Route:

- A privately owned mining operation (ASIS ID 73087) was identified within the route width of the Blue Route in T123N, R28W, Section 22, SE ¼ NE ¼, in Stearns County. This mining operation does not appear to be active based on review of aerial imagery. The Application alignment is on the opposite side of County Road 7 from the location provided by the ASIS data.
- A mining operation owned by MNDOT (ASIS ID 73079) was identified within the route width of the Blue Route in T122N, R29W, Section 35, E ½ E ½ NE ¼, in Stearns County. The mining operation appears to be active based on review of aerial imagery. The 150-foot right-of-way crosses the eastern edge of the mining operation, but the Application alignment follows the eastern parcel boundary.
- A privately owned mining operation (ASIS ID 64001) was identified within the route width of the Blue Route in T112N, R35W, Section 17, NE ¼ NE ¼, in Redwood County. The mining operation appears to be inactive based on review of aerial imagery and the area appears to be actively cultivated. The

ASIS data shows the mining operation within the 150-foot right-of-way of the Application alignment.

- A privately owned mining operation (ASIS ID 64030) was identified within the route width of the Blue Route in T112N, R36W, Section 16, SE 1/4-SE1/4, in Redwood County. The mining operation appears to be inactive based on review of aerial imagery and the area appears to be actively cultivated. The ASIS data shows the mining operation within the 150-foot right-of-way of the Application alignment.
- A privately owned mining operation (ASIS ID 64009) was identified within the route width of the Blue Route in T110N, R39W, Section 18, SW ¼ NE ¼, in Redwood County. Based on review of aerial imagery, the mining operation appears to be inactive, and the parcel appears to be actively cultivated. The ASIS data shows the mining operation outside of the 150-foot right-of-way.

6.3.4.1 Impacts and Mitigation – All Routes

Placement of transmission line towers or substations near mining operations could interfere with access to existing mines and could limit the future expansion of the mining operation.

No active mining operations are located within the 150-foot right-of-way of the Purple or Blue Routes or within the proposed substation siting areas. If the Purple Route is chosen by the Commission, the Applicant will coordinate with the owner of mining operation ASIS ID 73164 to ensure Project construction does not interfere with access to the mining operation. Construction of the Project will require the use of sand and aggregate for structure backfill and to construct reliable access routes for construction equipment. Based on availability, some of the sand and aggregate material could come from sources near the Project. Increased demand for sand and aggregate material as a result of the Project would be temporary and limited to the period of construction. Additional new mining operations or expansion of existing mines would not be necessary to satisfy Project demand. No direct impacts to mining operations will occur as a result of the Project and no mitigation measures are proposed.

6.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Cultural resources include archaeological and historic architectural resources that provide important information about the history of human occupation and alteration of the landscape over time. Archaeological resources include prehistoric and historic artifacts, structural ruins, or earthworks that are typically found either partially or completely below the ground surface. Historic architectural resources include standing structures, such as buildings and bridges, as well as historic districts and landscapes.

Background research on known cultural resources within the Purple and Blue Routes was conducted in July 2023. Files were requested from the Minnesota State Historic Preservation Office (SHPO) in St. Paul. Additionally, online files from the Office of the State Archaeologist (OSA) were reviewed.

Information regarding known archaeological sites and architectural inventory resources recorded within the Purple and Blue Routes during previous professional cultural resources surveys were collected and reviewed. The archaeological assemblage includes historic mortuary sites, Native American mounds and earthworks, prehistoric burial grounds and habitation sites, historical remains, and other archaeological features. Historic assemblages include historic cemeteries.

The data were further analyzed based on specific routes retained for the analysis and additional research was conducted in public online records. This information was used to identify types of archaeological sites that may be encountered and landforms or geographic features that have a higher potential for containing significant cultural resources. The results of the background research to identify known cultural resources within the Purple and Blue Routes is shown on the Archaeological and Historic Resource Maps in Appendix I. These maps are marked as Protected and Confidential in pursuant to Minn. R. 7829.0500 and Minn. Stat. Ch. 13.

The Purple Route traverses both the Deciduous Lakes Archaeological Region (Region 4), and the Prairie Lakes Archaeological Region (Region 2). The Purple Route is within the Deciduous Lakes Region from the northern terminus to mid-eastern Kandiyohi County. The Deciduous Lakes Region covers most of central and east-central Minnesota and extends into west-central Wisconsin. The remainder of the Purple Route is within the Prairie Lakes Region from Kandiyohi County to the southern terminus of the route. The Prairie Lakes Region covers most of southwestern and south-central Minnesota and extends into northeastern South Dakota and north central Iowa (Gibbon, 2012).

The Blue Route traverses the same archaeological regions along a different path. The Blue Route is within the Deciduous Lakes Region from the northern terminus of the

route to southwestern Meeker County. The route then continues through the Prairie Lakes Region from southwestern Meeker County to the southern terminus of the route.

The Deciduous Lakes Region is defined by its many rivers and waterways, including the Mississippi-Sauk River which flows through the eastern and central parts of the region, as well as the Lower St. Croix River which defines the eastern boundary. Additional important waterways include the Crow, Rum, Snake, and Red Rivers. Bedrock outcroppings are limited and are generally comprised of granite. Historically, the region has been dominated by elm, maple, and basswood trees with incursions of prairie and oak woods. The northern area of the region was predominately a mixed deciduous-coniferous forest, while the eastern portion was an oak forest. Precontact game animals in this region included deer, bison, elk, beaver, black bear, and moose. The Woodland Period (ca. 1000-500 BC to AD 1650) in this region is moderately well-defined due to the rich archaeological record defined by a variety of pottery assemblages which help define time periods as well as geographic locations. This area also includes complex burials at an earlier date than the Prairie Lake Region. Common site types in the Deciduous Lakes Region from the Lake Woodland Period (ca. AD 500-700 to 1650) include semi-sedentary villages, wild rice harvesting and fishing stations, and a variety of hunting and gathering sites (Gibbon, 2012).

The Prairie Lakes Region contains the swell and swale of a typical ground moraine, with hilly end moraines found at the northern, eastern, and southern edges. The two major topographic features are the Minnesota River Valley which bisects the area, and the Coteau des Prairies highland to the west. Larger rivers within the region follow the path of glacial meltwater channels, and all rivers in this region empty into the Mississippi River. Bison, elk, and white-tailed deer were historically present in this region, which is filled with many shallow prairie "pothole" lakes. Late Archaic components are limited in this region and have been grouped into the Mountain Lake phase (3800-200 BC). The transition into the Woodland Period (ca. 1000-500 BC to AD 1650) is generally defined by the introduction of distinctive ceramics; however, the ceramic assemblage of the Prairie Lakes Region remains poorly understood. The small amount of assemblages in this region present pottery that have well-defined vertical cordmarking on the exterior surface, thick body walls, and fingernail impression decorations along the rim. Near the end of the Woodland Period, around AD 700, ceramic technology changed dramatically, and burial mounds were widespread. These changes mark the beginning of the Lake Benton Phase, a transitional phase from the Precontact era into the Contact era. The Prairie Lakes Region contains the largest concentration of Lake Benton sites south of the Minnesota River and east of the Blue Earth River (Gibbon, 2012).

Across both regions, the emergence of the Post-contact Period saw dramatic changes in the lifeways of both Native American and European American communities. The factors which had previously influenced the locations of Native American settlements, such as access to subsistence resources, began to change. As Euro-American settlers gained farmland, the landscape of the state changed. Rural landscapes became dominated by homesteads and farm fields cut by drainages, both natural and manmade. In rural areas, which are common in both archaeological regions, this agricultural landscape remains largely intact.

Regionally, archaeological sites are generally located in proximity to established water resources. Early prehistoric sites may be deeply buried in the colluvium and alluvium along major river valleys. Middle to late Prehistoric sites can be found on the islands and peninsulas of moderate to large-sized lakes, as well as in the wooded areas of galley forests along the major rivers. Late Prehistoric sites include large agricultural village sites located on terraces of the major river systems. Small campsites and special activity sites from all periods are scattered throughout the region. Some deeply buried Late Prehistoric period sites may also be present in the Minnesota River valley. Historic village sites associated with the Dakota are concentrated along the Minnesota River. Trading posts were concentrated for the most part along the upper Minnesota River between 1750-1800. By the early 1800s they were established by American traders at wooded locations in the interior.

6.4.1 Previously Recorded Archaeological and Historic Resources

6.4.1.1 Purple Route

Background literature review identified six previously documented archaeological sites, 30 architectural resources, and nine historic cemeteries within the Purple Route (refer to Table 6.4.1-1). The historic cemeteries and burial mound are mortuary sites and are protected by Minnesota's Private Cemeteries Act (Minn. Stat. § 307.08). Due to this protection, mortuary sites are not listed on the National Register of Historic Places (NRHP). Prior to any planned fieldwork, additional research will be conducted with historic maps to confirm locations of cemeteries. None of the previously recorded archaeological resources have been evaluated for listing in the NRHP.

Table 6.4.1-1 Archaeological and Architectural Resources and Historic Cemeteries within the Purple Route			
Site Number/Site Name[1]	**Site Type**	**NRHP Status**	**Site within Right-of-Way**
21CPa/Stanley Minaas III	Mortuary (Alpha)	Protected under Minn. Stat § 307.08	Yes
21CP0011/Stanley Minaas I	Burial Mound (razed)	Protected under Minn. Stat § 307.08	Yes
21KH0173/Old Baptist Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
21LY0039/Blanche de Reu	Lithic Scatter	Unevaluated	Yes
21LY0079/Lake of the Hill	Lithic Scatter	Unevaluated	No
21YM0074/Helvig	Lithic Scatter	Unevaluated	No
East Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
English Cemetery	Mortuary	Protected under Minn. Stat § 307.08	Yes
Gibson Graves	Mortuary	Protected under Minn. Stat § 307.08	No
Immanuel Lutheran Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
KH-XXX-001/Former TH 10 (Trunk Highway 12)	Transportation	Unevaluated	Yes
LY-SOD-001/Township Hall	Government	Unevaluated	No
LY-SOD-003/Bridge 42513	Transportation	Unevaluated	Yes
Miller Cemetery	Mortuary	Protected under Minn. Stat § 307.08	Yes
Old Baptist Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
SH-CLT-011/Fort Ripley Military Road: Clear Lake Twp. Segment	Transportation	Unevaluated	Yes
St. Peters Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
Tripolis Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
Unknown Cemetery	Mortuary	Protected under Minn. Stat § 307.08	No
WR-CWT-007	Agriculture	Unevaluated	Yes

Table 6.4.1-1 Archaeological and Architectural Resources and Historic Cemeteries within the Purple Route			
Site Number/Site Name[1]	Site Type	NRHP Status	Site within Right-of-Way
WR-CWT-012/house and outbuildings	Domestic	Unevaluated	No
WR-SCK-014/house	Domestic	Unevaluated	Yes
WR-SCK-015/house and garage	Domestic	Unevaluated	No
WR-SCK-016/house and garage	Domestic	Unevaluated	No
WR-SCK-017/Institutional Property	Government	Unevaluated	No
WR-SCK-018/house and garage	Domestic	Unevaluated	No
WR-SCK-021/house and outbuildings	Domestic	Unevaluated	No
WR-SCK-022/Hasty Inn	Commerce	Unevaluated	No
WR-SCK-023/house	Domestic	Unevaluated	No
WR-SCK-025/house and outbuildings	Domestic	Unevaluated	No
WR-SCK-026/house	Domestic	Unevaluated	No
XX-ROD-016/Trunk Highway/U.S. Highway 14 (formerly Trunk Highway 7)	Transportation	Unevaluated	Yes
XX-ROD-026/Trunk Highway 4	Transportation	Unevaluated	Yes
XX-ROD-039/Trunk Highway 212	Transportation	Unevaluated	Yes
XX-ROD-041/Trunk Highway 19	Transportation	Unevaluated	Yes
XX-ROD-043/Trunk Highway 55	Transportation	Unevaluated	Yes
XX-ROD-111/Trunk Highway 12	Transportation	Unevaluated	Yes
XX-ROD-151/Trunk Highway 7	Transportation	Unevaluated	Yes
XX-ROD-152/Trunk Highway 23	Transportation	Unevaluated	Yes
XX-ROD-161/Trunk Highway 15	Transportation	Unevaluated	Yes
XX-ROD-163/Trunk Highway 71	Transportation	Unevaluated	Yes
XX-RVR-008/Minnesota River Channel northwest of Granite Falls	Landscape	Unevaluated	Yes

Table 6.4.1-1 Archaeological and Architectural Resources and Historic Cemeteries within the Purple Route			
Site Number/Site Name[1]	Site Type	NRHP Status	Site within Right-of-Way
YM-SND-005/92457	Transportation	Unevaluated	Yes
YM-SYR-018/Douglas Peterson House	Domestic	Unevaluated	No
YM-SYR-040/Peterson Barn	Agriculture	Unevaluated	Yes

[1] Alpha sites are indicated by a lower case letter(s) after the county initials in the site number; these sites were identified through historic documentation and have not been verified by a professional archaeologist.

6.4.1.2 Blue Route

Background literature review identified 10 previously documented archaeological sites and 16 architectural resources within the Blue Route (refer to Table 6.4.1-2). Two of these archaeological sites are mortuary sites and are protected by Minnesota's Private Cemeteries Act (Minn. Stat. § 307.08); therefore, mortuary sites are not listed in the NRHP. Prior to any planned fieldwork, additional research will be conducted with historic maps to confirm locations of mortuary sites. None of the previously recorded archaeological resources have been evaluated for listing in the NRHP.

Table 6.4.1-2 Archaeological and Architectural Resources and Mortuary Sites within the Blue Route			
Site Number/Site Name[1]	Site Type	NRHP Status	Site within Right-of-Way
21LY0017/Monsen III	Lithic Scatter	Unevaluated	Yes
21RNad	Trading Post (Alpha)	Unevaluated	Yes
21RW0001	Burial Mound	Protected under Minn. Stat § 307.08	Yes
21RW0033	Artifact Scatter	Unevaluated	No
21RW0072	Lithic Scatter	Unevaluated	Yes
21RW0140	Lithic Scatter	Unevaluated	No
21SH0058/Lee Pioneer Burial	Mortuary	Protected under Minn. Stat § 307.08	No
21SH0088	Historic Isolated Find	Unevaluated	No

Table 6.4.1-2 Archaeological and Architectural Resources and Mortuary Sites within the Blue Route

Site Number/Site Name[1]	Site Type	NRHP Status	Site within Right-of-Way
21SHj	Artifact Scatter (Alpha)	Unevaluated	No
21SNp	Ruin (Alpha)	Unevaluated	No
RW-GAL-005/Bridge No. 89874	Transportation	Unevaluated	No
RW-GAL-006/Bridge No. 89876	Transportation	Unevaluated	No
RW-GRK-003/Unnamed Ditch	Agricultural	Unevaluated	No
RW-SHR-005/Bridge 89888	Transportation	Unevaluated	Yes
SH-CLT-006/District School No. 23	Education	Unevaluated	Yes
SH-CLT-011/Fort Ripley Military Road: Clear Lake Twp. Segment	Transportation	Unevaluated	Yes
SN-LYN-011/St. Paul, Minnesota, and Manitoba Railway – Osseo Branch	Transportation	Unevaluated	No
SN-SAT-003/School	Education	Unevaluated	No
XX-ROD-016/Trunk Highway/U.S. Highway 14 (formerly Trunk Highway 7)	Transportation	Unevaluated	Yes
XX-ROD-026/Trunk Highway 4	Transportation	Unevaluated	Yes
XX-ROD-041/Trunk Highway 19	Transportation	Unevaluated	Yes
XX-ROD-043/Trunk Highway 55	Transportation	Unevaluated	Yes
XX-ROD-111/Trunk Highway 12	Transportation	Unevaluated	Yes
XX-ROD-151/Trunk Highway 7	Transportation	Unevaluated	Yes
XX-ROD-161/Trunk Highway 15	Transportation	Unevaluated	Yes
XX-ROD-163/Trunk Highway 71	Transportation	Unevaluated	Yes

[1] Alpha sites are indicated by a lower case letter(s) after the county initials in the site number; these sites were identified through historic documentation and have not been verified by a professional archaeologist.

6.4.2 Impacts and Mitigation – All Routes

Construction and operation of transmission line and substation projects have the potential to impact archaeological and historic resources. Archaeological resources could be impacted by the disruption or removal of subsurface archaeological materials, structural remains, or earthworks during transmission line and substation construction. Historic architectural resources may be impacted by the placement of a transmission line or substation within the established viewshed of an historic property, which could

affect the integrity of the viewshed in a way that decreases the historic value of the resource.

Information regarding the location of previously documented cultural resources sites was taken into consideration during initial route design. The Applicant made efforts to design the routes to minimize any physical impacts to all known cultural resources.

The Applicant will assess the potential for previously undocumented cultural resources in the vicinity of the Project and conduct additional research with historic maps to confirm locations of cemeteries. Archaeological resources would most likely be located on or near elevated landforms and areas near permanent water sources. For this Project, the Applicant will work cooperatively with the SHPO and interested Tribal Nations to design an appropriate survey strategy for the Project, conduct both a Phase I Cultural Resource Reconnaissance survey and an Architectural History Inventory (Phase I Survey), and avoid or mitigate potential effects on resources identified during survey.

The Phase I Survey will focus on areas proposed for Project construction, including transmission structure locations, substation sites, associated construction access roads, and temporary workspace areas. These investigations will be conducted by a professional archaeologist meeting the Secretary of the Interior's Standards for Archaeology as published in Title 36 Code of Federal Regulations (CFR) Part 800. Survey strategies (pedestrian and/or shovel probing and/or deep testing) for the Phase I Survey will depend on surface exposure and the characteristics of the landforms proposed for development. After receiving the proposed final Project route and layout, archaeologists will design an appropriate survey strategy for archaeological resources. This proposed survey strategy will be shared with SHPO and interested Tribal Nations to gather their input on the methodology prior to completing the study. The Applicant plans to conduct a Phase I Survey when ground surface visibility is optimum for pedestrian survey. The architectural survey will address the potential effects of the proposed project on architectural properties eligible for listing in the NRHP.

If cultural resources or mortuary sites/cemeteries are identified during the Phase I Survey, avoidance will be the primary mitigation measure to avoid affecting these resources during construction of the Project. Avoidance of resources may include minor adjustments to the Project design and designation of sensitive areas to be left undisturbed or spanned by the Project. The Applicant will develop and Unanticipated Discoveries Plan for use during construction of the Project that outlines the procedures to be followed in the event unanticipated archaeological materials are found. If archaeological resources are discovered during construction, construction activity would be halted in that location, the SHPO and interested Tribal Historic Preservation Officers (THPOs) would be notified, and appropriate measures would be implemented to protect the resource. Additionally, if unanticipated human remains are discovered

during construction, they will be reported to the State Archaeologist per Minnesota Statutes Section 307.08 and construction will cease in that area until adequate mitigation measures have been developed between the Applicant and the State Archaeologist.

6.5 NATURAL ENVIRONMENT

6.5.1 Air Quality and Greenhouse Gas Emissions – All Routes

6.5.1.1 Criteria Pollutants

Section 109(b) of the Clean Air Act (CAA) requires that the EPA establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and welfare (40 CFR Part 50). The CAA identifies two classes of NAAQS: primary standards, which are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly; and secondary standards which are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The EPA has promulgated NAAQS for six criteria pollutants: ozone (O_3), particulate matter (PM_{10}/$PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and lead (Pb).

Across the country, the USEPA and state agencies operate a system of air quality monitoring stations. Readings from these stations are compared to the NAAQS as a way to classify the air quality of the area surrounding the monitoring stations. Areas of the country that do not meet the NAAQS are classified as "non-attainment" areas. Regions that were classified as non-attainment and have improved their air quality to meet the NAAQS are considered to be in "maintenance." Areas of the country that are not represented by a monitoring station are considered "unclassifiable." Unclassifiable areas are considered to be in attainment with the NAAQS.

The Project Study Area does not cross any areas classified as non-attainment for the NAAQS for any criteria pollutants (EPA, 2023b).

Emissions Related to Construction

Construction of the Project will result in intermittent and temporary emissions of criteria pollutants. These emissions generally include dust generated from soil disturbing activities, such as earthmoving and wind erosion associated with right-of-way clearing, combustion emissions from construction machinery engines, and indirect emissions attributable to construction workers commuting to and from work sites during construction. Construction emissions would be dependent upon weather conditions, the amount of equipment at any specific location, and the period of operation required for construction at that location.

Table 6.5.1-1 summarizes the estimated potential emissions of criteria pollutants from construction activities for the Project, including transmission line and substation facility work. Construction emissions are calculated based on typical counts of diesel-fueled construction equipment, expected hours of operation, and estimated vehicle miles traveled. Earthmoving emissions assume the entire right-of-way and/or substation site is cleared during construction. Supporting emission calculations are provided as Appendix J. Air emissions from the construction equipment will be limited to the immediate vicinity of the construction area and will be temporary. Therefore, it is not anticipated that construction activities will independently cause or significantly contribute to an emission level that results a violation of NAAQS. At the completion of construction activities, all construction-related air impacts would cease.

Table 6.5.1-1 Construction Emissions of Criteria Pollutants (tons)

Description	NO_X [a]	CO	VOC [b]	SO_2	PM_{10}	$PM_{2.5}$
Off-Road Engine Emissions	302.50	66.66	21.76	0.15	11.06	10.97
Helicopter Engine Emissions	0.04	170.32	0.01	--	0.51	0.05
Paved Roads	--	--	--	--	32.42	3.24
Unpaved Roads	--	--	--	--	--	--
Earthmoving	--	--	--	--	353.46	37.30
Total	**302.54**	**236.98**	**21.77**	**0.15**	**397.44**	**51.57**

Note NO_X = oxides of nitrogen and VOC = volatile organic compounds

Emissions Related to Operation

During operation of the line and substations, air emissions would be minimal. Small amounts of oxides of nitrogen (NO_X) and ozone are created due to corona from the operation of transmission lines. The production rate of ozone due to corona discharges decreases with humidity and less significantly with temperature. Rain causes an increase in ozone production, but also accelerates the decay of ozone. Ozone production by high voltage transmission lines is not detectable during fair weather above ambient conditions. Ozone production under wet-weather conditions is detectable with special efforts but will result in emissions below the NAAQS and therefore is considered insignificant.

In addition to weather conditions, design of the transmission line also influences ozone production rate. The ozone production rate decreases significantly as the conductor diameter increases and is greatly reduced for bundled conductors over single conductors. Conversely, the production rate of ozone increases with applied voltage. The emission of ozone from the operation of a transmission line of the voltages

proposed for the Project would be minimal, as discussed above, and is not anticipated to have a significant impact on the environment.

Emissions will be generated during routine inspection and maintenance activities. Xcel Energy will perform an annual aerial inspection of the line. Once every four years, crews will visually inspect the lines from the ground. Additionally, vegetation maintenance will generally occur once every four years. Routine inspection and maintenance activities will not have a significant impact on ambient air quality.

6.5.1.2 Greenhouse Gas Emissions

The State of Minnesota is proactively implementing measures to reduce greenhouse gas (GHG) emissions. Between 2005 and 2020, GHG emissions experienced a 23 percent reduction across all industry sectors (Minnesota Department of Commerce, 2023). GHGs are assigned a global warming potential (GWP) that describes the amount of energy 1 ton of the gas will absorb over a 100-year period compared to carbon dioxide. Methane (CH_4) has a GWP of 25, meaning that methane is 25 times more potent than carbon dioxide. Sulfur hexafluoride (SF_6), discussed in the following sections, has GWP of 22,800 (40 CFR 98 Table 1).

Emissions Related to Construction

Project construction activities will result in temporary and intermittent GHG emissions from fuel combustion in construction equipment and commuter vehicles. Table 6.5.1-2 summarizes the estimated potential emissions of GHG from construction activities for the Project. Emissions are based on typical counts of construction equipment, typical fuel types, expected hours of operation, and estimated vehicle miles traveled. Detailed emission calculations are provided as Appendix J. At the completion of construction activities, all construction-related air impacts would cease.

Table 6.5.1-2 Construction Emissions of Greenhouse Gases(short tons)

Description	CO_2	CH_4	N_2O	CO_2e
Off-Road Engine Emissions	0.00	0.00	0.00	0.00
On-Road Engine Emissions	4,843.67	0.00	0.00	4843.67
Helicopter Engine Emissions	1,291.82	0.05	0.05	1,309.15
Total	**6,135.49**	**0.05**	**0.05**	**6,152.82**

Note: CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; and CO_2e = carbon dioxide equivalent

Emissions Related to Operation

Sulfur hexafluoride (SF_6) is a potent GHG used in certain substation equipment such as circuit breakers and other switchgear. Minor releases of SF_6 could occur as part of regular operation and maintenance activities.

6.5.1.3 Air Quality and Green House Gas Emissions Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact air quality through temporary, construction-related impacts from vehicle emissions and dust. Operation of transmission lines and substations has the potential to create ozone and NO_x due to corona discharges; however, these emissions will be insignificant.

Construction and Operation Emissions

The amount of dust generated during construction activities would be a function of construction activity, soil type, soil moisture content, wind speed, precipitation, vehicle traffic, vehicle types, and road surface characteristics. Emissions would be greater during dry periods and in areas where fine-textured soils are subject to surface activity. If construction activities generate problematic dust levels, the Applicant may employ construction-related practices to control fugitive dust such as application of water or other commercially available non-chloride dust control agents on unpaved areas subject to frequent vehicle traffic, reducing the speed of vehicular traffic on unpaved roads, and covering open-bodied haul trucks.

During operation, corona effects will be minimized by using good engineering practices, such as using bundled conductors. A corona signifies a loss of electricity, so the Applicant will engineer the transmission lines to limit the corona.

Greenhouse Gas Emissions

According to the EPA's Greenhouse Gas Reporting Tool, GHG emissions from Minnesota totaled 38,237,276 metric tons of carbon dioxide equivalent (CO2e) (42,149,382 tons) in 2021 (EPA, 2023c). Compared to the state-wide emissions, the estimated GHG emissions from the Project will be negligible. During construction, Xcel Energy will mitigate vehicle emissions by limiting vehicle idling to only times when necessary. During operation, Xcel Energy will mitigate SF_6 emissions through BMPs such as following safe handling practices during refilling, avoiding exposure to high temperatures, and monitoring for leaks. Xcel Energy will comply with Environmental Protection Agency reporting requirements in the event a leak is detected.

The Project will support Xcel Energy's and the State's transition to renewable energy by enabling replacement of electricity generated from the Sherco coal-fired generating plant with electricity from renewable sources such as solar and wind farms. In Minnesota, the most efficient area for collecting both solar and wind power is in the southwest region of the state. The Project will bring electricity collected in the southwest portion of the state to the existing Sherco Substation. Overall, the Project will help to facilitate a net reduction in GHG emissions.

6.5.2 Geology and Groundwater Resources

The MNDNR divides Minnesota into six groundwater provinces based on bedrock and glacial geology. The aquifers within these provinces occur in two general geologic settings: bedrock, and unconsolidated sediments deposited by glaciers, streams, and lakes. Both the Purple and Blue Routes would cross three main groundwater provinces: the Central Province, Western Province, and the Arrowhead-Shallow Bedrock Province (MNDNR, 2021a).

Purple Route

The northeast area of the Purple Route in Sherburne, Wright, Stearns, Meeker and northern Kandiyohi counties crosses the Central Province, which is characterized by surficial and buried sand and gravel aquifers underlain by bedrock of Cretaceous shale and sandstone and Precambrian igneous and metamorphic rocks. Unconsolidated sediments in this province range in thickness from 50 to 650 feet, with the exception of areas of Cretaceous bedrock near the surface, such as in Meeker County near the City of Eden Valley. Cretaceous bedrock units occurring beneath glacial sediment but above Precambrian bedrock are used locally as water sources with limited aquifer characteristics. In the Central Province, groundwater within the unconsolidated surficial and buried glacial sand and gravel aquifers is commonly used as a water source (MNDNR, 2021a).

The central portion of the Purple Route in southern Kandiyohi, Chippewa, Renville, Yellow Medicine and southern Lyon counties crosses the Western Province, characterized by loamy glacial sediment with underlying Cretaceous shale and sandstone and Precambrian igneous and metamorphic rocks. Areas of Cretaceous bedrock, consisting of sandstone layers interbedded with thick layers of shale or mudstone are present at the north end of the Purple Route in Stearns and Meeker counties. Unconsolidated sediments in this province range in thickness from 50 to 550 feet, with the exception of areas of shallow Precambrian bedrock particularly in Chippewa, Yellow Medicine and Lyon counties. In the Western Province, surficial sand aquifers are moderately available for groundwater use (MNDNR, 2021a).

Areas of the southwestern end of the Purple Route in Chippewa County (at the Minnesota River), Yellow Medicine and Lyon counties cross the Arrowhead-Shallow Bedrock Province, characterized by exposed or shallow (less than 50 feet) Precambrian bedrock and, to a lesser extent Cretaceous bedrock. Along the Purple Route, there are areas where bedrock outcrops or is present just below the surface (less than 20 feet deep) in Chippewa and Yellow Medicine counties. In the Arrowhead/Shallow Bedrock Province, unconsolidated sediments are thin or absent and the exposed or shallow bedrock has limited availability for aquifers and groundwater (MNDNR, 2021a).

Blue Route

The northeast area of the Blue Route in Sherburne, Stearns and Meeker counties crosses the Central Province, which is characterized by surficial and buried sand and gravel aquifers underlain by bedrock of Cretaceous shale and sandstone and Precambrian igneous and metamorphic rocks. Areas of Cretaceous bedrock, consisting of sandstone layers interbedded with thick layers of shale or mudstone are present in the north end of the Blue Route in Stearns and Meeker counties. Unconsolidated sediments in this province range in thickness from 50 to 650 feet, with the exception of areas of Cretaceous bedrock near the surface, such as in Meeker County near the City of Eden Valley. Cretaceous bedrock units occurring beneath glacial sediment, but above Precambrian bedrock is used locally as water sources with limited aquifer characteristics. In the Central Province, groundwater within the unconsolidated surficial and buried glacial sand and gravel aquifers is commonly used as a water source (MNDNR, 2021a).

The central portion of the Blue Route in southern Kandiyohi, Renville, Redwood, and southern Lyon counties crosses the Western Province, characterized by loamy glacial sediment with underlying Cretaceous shale and sandstone and Precambrian igneous and metamorphic rocks. Unconsolidated sediments in this province range in thickness from 50 to 550 feet, with the exception of areas of shallow Precambrian bedrock particularly in Redwood and Lyon counties. In the Western Province, surficial sand aquifers are moderately available for groundwater use (MNDNR, 2021a).

Areas of the northeastern and southwestern ends of the Blue Route in Stearns, Renville (at the Minnesota River), Redwood, and Lyon counties cross the Arrowhead-Shallow Bedrock Province, characterized by exposed or shallow (less than 50 feet) Precambrian bedrock and, to a lesser extent Cretaceous bedrock. Along the Blue Route, there are areas where bedrock outcrops are present just below the surface (less than 20 feet deep) in Redwood and Renville counties. In the Arrowhead/Shallow Bedrock Province, unconsolidated sediments are thin or absent and the exposed or shallow bedrock has limited availability for aquifers and groundwater (MNDNR, 2021a).

6.5.2.1 Public and Private Water Supply

The Applicant reviewed the route options for EPA designated sole source aquifers (SSA), wells listed on the Minnesota County Well Index (CWI), Minnesota Department of Health (MDH) Wellhead Protection Areas (WHPAs) and Drinking Water Supply Management Areas (DWSMAs).

Under the Safe Drinking Water Act (SDWA), each state is required to develop and implement a Wellhead Protection Program to identify the land and recharge areas contributing to public supply wells and prevent the contamination of drinking water supplies. The SDWA was updated in 1986 with an amendment requiring the development of a broader-based Source Water Assessment Program, which includes the assessment of potential contamination to both groundwater and surface water through a watershed approach. As a result, Minnesota adopted the State Wellhead Protection Rule 4720.5100-4720.5590 in 1997 (MDH, 2023a).

Public and non-public community water supply source-water protection in Minnesota is administered by the MDH through its Wellhead Protection Program. A WHPA encompasses the area around a drinking water well where contaminants could enter and pollute the well. WHPAs for public and community water-supply wells are delineated based on a zone of capture for a 10-year groundwater time-of-travel to the well and are available through a database maintained by the MDH. DWSMAs are areas containing the WHPA but are outlined by clear boundaries, like roads or property lines. The DWSMA is managed in a WHP plan, usually by a city (MDH, 2023b).

Purple Route

The EPA defines a SSA or principal source aquifer area as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2022). There are currently no EPA-designated SSAs crossed by the Purple Route (EPA, 2023d).

The CWI is the most complete record of well construction and location in Minnesota and is kept up-to-date and maintained by the Minnesota Geological Survey, in cooperation with the MDH. A search of the CWI (MDH, 2023c) identified 56 water supply wells within 150 feet of the 150-foot right-of-way of the Purple Route.

Table 6.5.2-1 below summarizes the DWSMAs, and WHPAs contained within if applicable, which are included in the MDH database and are crossed by the Purple Route's 150-foot right-of-way.

Table 6.5.2-1 Drinking Water Supply Management Areas and Wellhead Protection Areas Crossed by the Purple Route's 150-foot Right-of-Way			
County	**WHPA Name**	**Location**	**Vulnerability to Contamination**
Meeker	Eden Valley DWSMA / WHPA	Directly SE of City of Eden Valley	High
Kandiyohi	Raymond 3 DWSMA / WHPA	Directly NE of City of Raymond	Moderate
Kandiyohi	Raymond 2 DWSMA	Directly E of City of Raymond	Moderate
Yellow Medicine	Marshall-Sandnes Wellfield DWSMA / WHPA	2 miles NE of City of Cottonwood	Low
	Cottonwood DWSMA / WHPA	1.4 miles NW of City of Cottonwood	Low
Source: Reports and Geospatial Data, Source Water Protection, Wellhead Protection Areas. (MDH, 2023b)			

Blue Route

There are currently no EPA-designated SSAs crossed by the Blue Route (EPA, 2023d).

A search of the CWI (MDH, 2023c) identified 41 water supply wells within 150 feet of the 150-foot-wide right-of-way of the Blue Route.

Table 6.5.2-2 below summarizes the DWSMAs, and WHPAs contained within if applicable, which are included in the MDH database and are crossed by the Blue Route's 150-foot right-of-way.

Table 6.5.2-2 Drinking Water Supply Management Areas and Wellhead Protection Areas Crossed by the Blue Route's 150-foot Right-of-Way			
County	**DWSMA / WHPA Name**	**Location**	**Vulnerability to Contamination**
Meeker	Eden Valley DWSMA / WHPA	Directly SE of City of Eden Valley	High
Renville	Bird Island DWSMA / WHPA	0.6 mile E of City of Bird Island	Low
Redwood	Redwood Falls West DWSMA / WHPA	Directly SW of City of Redwood Falls	Moderate
	Redwood Falls East 2 DWSMA / WHPA	2 miles S of City of Redwood Falls	Low
Stearns	Kimball DWSMA	Directly N and within the City of Kimball	High
Source: Reports and Geospatial Data, Source Water Protection, Wellhead Protection Areas. (MDH, 2023b)			

6.5.2.2 Springs and Karst Topography – Purple and Blue Routes

A search of the Minnesota Spring Inventory database (MNDNR, 2023d) resulted in no springs identified within the route width for either the Purple or Blue Routes. The Applicant reviewed the MNDNR Karst Feature Inventory and a report on Minnesota Regions Prone to Surface Karst Feature Development and did not identify karst topography within the Project Study Area (MNDNR 2023e; Adams et al, 2016).

6.5.2.3 Geology and Groundwater Resources Impacts and Mitigation -- All Routes

Construction and operation of transmission line projects has the potential to impact geology and groundwater through temporary, construction-related impacts and/or long-term impacts. Installation of structure foundations could impact bedrock and groundwater. In addition, disturbance of soils and vegetative cover could affect water quality in adjacent groundwater resources.

Depth of domestic water supply wells near the Purple Route range from 35 to 417 feet deep; near the Blue Route domestic water supply wells range from 50 to 650 feet deep (MDH, 2023a). The Applicant will continue to work with the landowners to identify springs and any additional wells near the Project. As stated above, karst topography does not occur in the Project Study Area.

The Applicant will conduct geotechnical evaluations prior to construction of the Project to identify locations where potential groundwater impacts could occur (e.g., shallow depth to groundwater resources). Structure foundations will generally range from 20

feet to 60 feet in depth. All foundation materials would be non-hazardous materials. In those areas where shallow depths to groundwater resources are identified during geotechnical investigations, specialty structures requiring wider, but shallower, excavation for foundations may be used. Depending on the results of the geotechnical evaluations, the Applicant will obtain a Water Appropriation Permit from MNDNR if groundwater dewatering activities are anticipated and would be greater than 10,000 gallons of water per day or 1 million gallons per year.

Overall impacts to groundwater resources are not anticipated as water supply needs will be limited and any effects on water tables would be localized and short term. Based on the small proportion of increased impervious surface area that will be created by Project components (i.e., substations and structure foundations), the Project will have minimal impacts on regional groundwater recharge. The Applicant will coordinate with the MNDNR, as necessary, to ensure that ground disturbing activities such as structure installation placement does not disrupt groundwater hydrology.

6.5.3 Soils

Soil characteristics along the route options were assessed using the SSURGO database (USDA, 2023). The SSURGO database is a digital version of the original county soil surveys developed by USDA - Natural Resources Conservation Service (NRCS) for use with GIS. It provides the most detailed level of soils information for natural resource planning and management.

Soil characteristics crossed by the rights-of-way of the Purple and Blue Routes are presented in Table 6.5.3-1. The various soil types crossed by the route options are generally loamy, silty clay loam, sandy loam or clay loam, are typically used for agricultural purposes, and range from very poorly drained to well-drained.

Table 6.5.3-1 Summary of Soil Characteristics Along the Route Options

Soil Characteristics	Purple Route	Blue Route
Total Right-of-Way Acres	3,100.2	3,161.4
Prime Farmland (acres/percent) [1]	2,317.1 / 74.7%	2,324.3 / 73.5%
Farmland of Statewide Importance (acres/percent) [2]	423.4 / 13.7%	430.2 / 13.6%
Wind Erodible (acres/percent) [3]	158.0 / 5.1%	313.5 / 9.9%
Water Erodible (acres/percent) [4]	247.6 / 8.0%	115.3 / 3.6%
Hydric (acres/percent) [5]	1,181.2 / 38.1%	1,521.3 / 48.1%
Revegetation Concerns (acres/percent) [6]	303.5 / 9.8%	362.4 / 11.5%
Compaction Prone (acres/percent) [7]	1,033.5 / 33.3%	1,378.8 / 43.6%

Table 6.5.3-1 Summary of Soil Characteristics Along the Route Options		
Soil Characteristics	**Purple Route**	**Blue Route**

Note: Soils may have more than one characteristic.

[1] Includes soils that meet the prime farmland or prime farmland if a limiting factor is mitigated.

[2] Includes soils classified as farmland of statewide importance by SSURGO.

[3] Includes soils in wind erodibility group designation of 1 or 2.

[4] Includes soils with a slope greater than 15 percent or soils with a K value of greater than 0.35 and slopes greater than 5 percent.

[5] Includes soils that are classified as hydric by SSURGO.

[6] Includes soils with a non-irrigated land capability classification of 3 or greater.

[7] Includes soils in somewhat poor to very poor drainage classes with surface textures of clay loam and finer.

Prime Farmland and Farmland of Statewide Importance

Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pasture, woodland, or other lands). Urbanized land and open water cannot be designated as prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods and is not subject to frequent or prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating; USDA - NRCS, n.d.).

The NRCS also recognizes farmlands of statewide importance, which are defined as lands other than prime farmland that are used for production of specific high-value food and fiber crops (e.g., citrus, tree nuts, olives, fruits, and vegetables). Farmlands of statewide importance have the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Farmland of statewide importance is similar to prime farmland but with minor shortcomings such as greater slopes or less ability to store soil moisture. The methods for defining and listing farmland of statewide importance are determined by the appropriate State agencies, typically in association with local soil conservation districts or other local agencies.

6.5.3.1 Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact soils during the construction and operation stages of a project. Construction may require some amount of grading to provide a level surface for safe operation of construction equipment. In addition, potential topsoil and subsoil mixing may result from the excavation, stockpiling, and redistribution of soils during installation of transmission line structures and substation components. Localized soil erosion, compaction, and topsoil and subsoil mixing could affect revegetation within temporary work areas. Construction of a substation would result in permanent impacts to soils for that facility's operational lifetime.

Temporary impacts to soils will occur during the construction of the transmission line. During construction, soil compaction and localized soil erosion may occur during clearing and grading of temporary work areas. Xcel Energy will implement measures to reduce soil compaction and will commit to decompaction of soils during restoration of temporary workspaces, including travel lanes. Impacts to soils along the transmission line would be temporary and minor and would be mitigated through the proper use and installation of BMPs, such as minimizing the number of vehicles trips, use of silt fencing or other effective sediment controls, and segregation of topsoil and subsoil.

Construction work within the substation sites will include site preparation, including grading, and installation of substructures and electrical equipment. Installation of concrete foundations and embedments for equipment will require the use of trenching machines, concrete trucks and pumpers, vibrators, forklifts, boom trucks, and large cranes. The limit of disturbance will be within the footprint of the substations for both the foundation equipment and the concrete delivery trucks. All topsoil from the substation footprints will be removed to a pre-established suitable location for storage. The storage area would be near the site where the soil was removed, accurately located (GPS boundary, soil depth) and graded to facilitate revegetation. Subsoil would be removed, if necessary, to an acceptable pre-established and approved area for storage.

Xcel Energy will also develop a SWPPP that complies with MPCA rules and guidelines; implementation of the protocols outlined in the SWPPP will minimize the potential for soil erosion during construction of the transmission line and substations. Xcel Energy will implement measures to reduce soil compaction and will commit to decompaction of soils during restoration of temporary workspaces. Landowners will be compensated accordingly for any localized crop damage that may occur.

Modifications to the Sherco and Sherco Solar West Substations and construction of the new Terminal, Intermediate, and Voltage Support Substations would result in permanent impacts to soils. Where present, operation of substations would constitute

a permanent loss of prime farmland soils. It is important to note that prime farmland soil designation is independent of current land use and soils at the proposed permanent facilities may have already been significantly modified by previous development or may not currently be used for agricultural purposes.

6.5.4 Lakes, Rivers, Streams, and Ditches

The Project occurs within the Upper Mississippi and Minnesota River Basins. Table 6.5.4-1 lists the watersheds crossed by each route alignment and are denoted by the 8-digit Hydrologic Unit Codes (HUC) as assigned by USGS. Major rivers crossed by the proposed route alignments include the Mississippi, Clearwater, Crow, Minnesota, Yellow Medicine, Redwood, and Cottonwood rivers (refer to Figure 6.5.4-1).

Table 6.5.4-1 Watersheds (HUC-8) Crossed by the Application Alignments

USGS Watershed Name	8-digit HUC-8	Purple Route Crossing Length (miles)	Blue Route Crossing Length (miles)
Sauk River	7010202	9.8	2.1
Clearwater Elk	7010203	30.5	37.8
North Fork Crow River	7010204	25.4	24.6
South Fork Crow River	7010205	13.4	33.6
Hawk-Yellow Medicine	7020004	63.7	1.0
Redwood River	7020006	9.6	14.3
Middle Minnesota	7020007	-	27.5
Cottonwood River	7020008	18.3	33.0
	Total	**170.6**	**173.9**

The Applicant reviewed available state and federal data and applicable regulations to determine the potential presence of lakes, rivers, streams and ditches within the 150-foot rights-of-way of the Application alignments. The findings are summarized in Table 6.5.4-2. Datasets and regulations reviewed include:

- MNDNR Hydrography Dataset
- MNDNR Public Waters Inventory (PWI) Basin and Watercourse Delineations
- MNDNR State Designated Trout Lakes and Streams
- Shallow Lakes Identified by MNDNR Wildlife
- MN RULE 7050.0335 – Designated Outstanding Resource Value Waters (ORVW)

- U.S. Army Corps of Engineers (USACE) Section 10 Navigable Waters of the United States in Minnesota

Table 6.5.4-2 Number of Water Resources Crossed by the 150-foot Rights-of-Way of the Application Alignments

Waterbody Feature	Purple Route	Blue Route
Total Streams/Rivers/Ditches	125	117
PWI Watercourses [1]	42	39
USACE Navigable Waters (Section 10) [1]	2	2
Trout Streams [1]	1	1
Outstanding Resource Value Waters [1, 2]	3	3
Total Lakes/Ponds	15	13
PWI Basins [3]	1	2
Trout Lakes [3]	0	0
Shallow Lakes [3]	1	4

[1] Included in total count of Streams/Rivers/Ditches

[2] State Outstanding Resource Value Waters listed are the three State Wild Scenic Rivers designated as Recreational and Scenic

[3] Included in total count of Lakes/Ponds

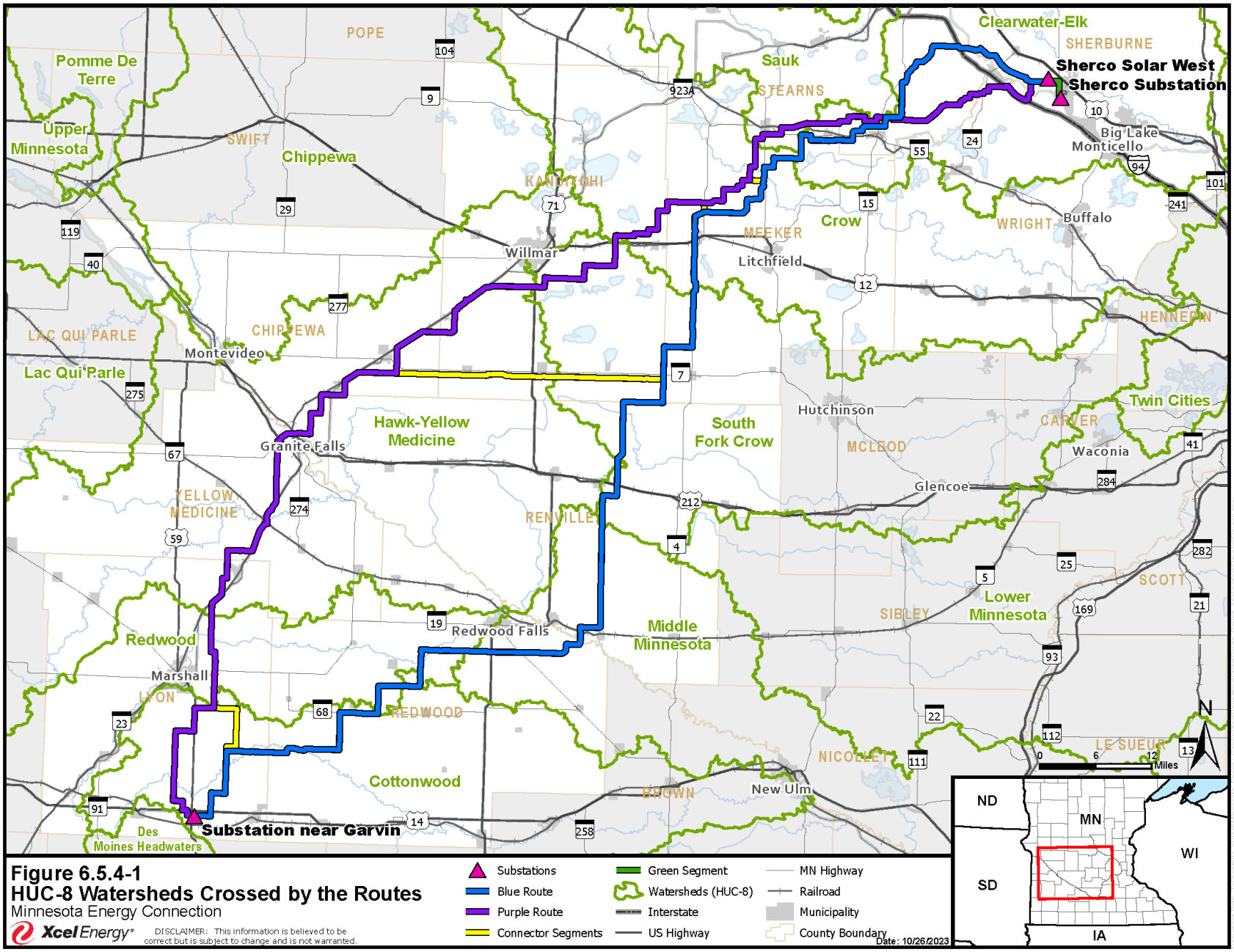


Figure 6.5.4-1
HUC-8 Watersheds Crossed by the Routes
Minnesota Energy Connection

Xcel Energy®

DISCLAIMER: This information is believed to be correct but is subject to change and is not warranted.

Clean Water Act

Section 404 of the Clean Water Act (CWA) prohibits discharge of dredged or fill materials into jurisdictional waters of the U.S. (WOTUS) without a permit from the USACE.

A Section 401 certification is necessary to obtain a federal permit for a project to ensure that the federal government does not issue a permit or license for a project that will result in a violation of the state water quality standards set under the CWA in WOTUS. The federal agency cannot issue a permit until the MPCA has either certified that the project impacting WOTUS will comply with state water quality standards or waived its review of the project.

The number of unique occurrences of lake, rivers, streams, and ditches within each routes' rights-of-ways are documented in Table 6.5.4-2. A similar number of waterbodies occur within the 150-foot right-of-way of both the Purple and Blue Routes; however, the Blue Route 150-foot-wide right-of-way is occupied by eight fewer occurrences of streams/rivers/ditches than the Purple Route and two fewer occurrences of lakes or ponds.

Public Waters

In Minnesota, rivers, streams, and lakes may be designated as Public Waters (Minn. Stat. § 103G.005, subd. 15). These waters are listed in the PWI and meet the criteria set forth in Minnesota Statute, Section 103G.005, Subdivision 15. A license from the MNDNR is required to cross PWI watercourses and basins with an electric transmission line (Minn. Stat. § 84.415) and a permit from the MNDNR is required to alter the course, current, or cross-section of any PWI water pursuant to the Minnesota Public Waters Work Permit Program (Minn. Stat. § 103G.245, subd. 1(2). The MNDNR PWI dataset was reviewed to identify Public Waters within the route options. PWI watercourses and basins, were identified along both Application routes. The number of unique occurrences of Public Waters within each routes' rights-of-ways are documented in Table 6.5.4-2. The Blue Route's 150-foot right-of-way has three fewer occurrences of PWI Watercourses than the Purple Route. The Purple Route's 150-foot right-of-way has one less occurrence of PWI Basins than the Blue Route.

Section 10 Waters

Navigable waters are designated by the USACE and regulated under Section 10 of the Rivers and Harbors Act of 1899. According to the USACE, the Mississippi and Minnesota Rivers are considered navigable throughout the length of the river, and therefore subject to Section 10 of the Rivers and Harbors Act of 1899. The number of unique occurrences of navigable waters within 150-foot rights-of-ways of the route options are documented in Table 6.5.4-2. Both the Purple and Blue Routes cross each navigable water once.

Other Designated Waters

Certain surface waters are designated as trout streams or lakes by the State of Minnesota, according to Minnesota Statutes Section 6264.0050. The number of unique occurrences of designated trout lakes and streams within the rights-of-way of the route options are documented in Table 6.5.4-2. One designated trout stream is located within the 150-foot right-of-way of both the Blue Route and Purple Route. The Blue Route crosses a trout stream at a perpendicular angle where the Blue Route is co-located with a state highway. The Purple Route crosses a trout stream at a perpendicular angle within a wooded greenfield area. No designated trout lakes are crossed by either of the route options.

Minnesota designates some water resources as ORVWs because of their exceptional qualities. As specified in Minnesota Rules, Wild, Scenic, and Recreational river segments comprise a part of the definition of ORVWs. Segments of the Mississippi, Minnesota, and North Fork of the Crow Rivers are designated as Scenic or Recreational. The number of unique occurrences of ORVWs within the rights-of-way of each route option are documented in Table 6.5.4-2. The North Fork of the Crow River is designated as Recreational where both the Purple and Blue Routes cross. The Purple Route crosses the Mississippi and Minnesota rivers where they are designated as Recreational; however, the Mississippi and Minnesota rivers are designated as Scenic where the Blue Route crosses.

The MNDNR Division of Fish & Wildlife – Wildlife Unit has developed a dataset of potential shallow lakes. A "shallow lake" is defined as a basin 50 acres or greater in size with a maximum depth of 15 feet or less. Lakes of unknown depths are also included in the dataset. The purpose of the dataset is to identify shallow lakes that may be valuable as wildlife habitat. The number of unique occurrences of shallow lakes within the rights-of-way of the route options are documented in Table 6.5.4-2. The Purple Route has three fewer occurrences of shallow lakes within its 150-foot right-of-way than the Blue Route. These occurrences of shallow lakes are not identified as wild rice

waters by the MNDNR statewide inventory of wild rice waters[14] or MNDNR 350 Important Wild Rice Waters in Minnesota[15]; however, one public water basin, Rice Lake, that is not identified as a shallow water lake is classified as a potential wild rice water[16] by the MNDNR Division of Fish & Wildlife. Rice Lake intersects the Purple Route in Wright County.

6.5.4.1 Water Quality Standards

Under the CWA, states have the primary responsibility for establishing, reviewing, and revising water quality standards, which consist of the designated uses of a waterbody, the numerical values or narrative water quality criteria necessary to protect those designated uses, and an antidegradation policy per 40 CFR §§ 131.10 - 131.12 and 131.4.

Impaired Waters

Under Section 303(d) of the CWA, states are required to assess all waters of the state to determine if they meet water quality standards, list waters that do not meet standards, update the list biannually, and conduct total maximum daily load studies (TMDL) to set pollutant-reduction goals needed to restore waters to the extent that they meet water quality standards for designated uses. The MPCA has jurisdiction over determining 303(d) waters in Minnesota and maintains an impaired waters list that includes all waters that fail to meet one or more water quality standards. The MPCA Impaired Waterbodies 2022 dataset was reviewed for impaired waters in close proximity to the proposed route options. Table 6.5.4-3 summarizes MPCA designated impaired waterbodies crossed by the proposed Application routes' 150-foot rights-of-way and the respective impairment parameter(s).

Table 6.5.4-3 Impaired Waterbodies Crossed by the 150-foot Rights-of-Way of the Application Alignments [1]

Waterbody Name	Impairment Parameter(s) [2]	Purple (No. of Crossings)	Blue (No. of Crossings)
Belle Creek	FishesBio; InvertBio	0	1
Buffalo Creek	FC; FishesBio; InvertBio	0	1
Clearwater River	DO; FishesBio	1	0
Cottonwood River	E.coli; FishesBio; Hg-F; InvertBio; TSS	1	2
Cottonwood River	FishesBio; Hg-F; InvertBio	0	4

14 https://files.dnr.state.mn.us/fish_wildlife/wildlife/wildrice/statewide-inventory-wild-rice-waters.pdf
15 https://www.eqb.state.mn.us/sites/default/files/documents/DNR%20350%20waters%20list_20181231.pdf
16 https://gisdata.mn.gov/dataset/biota-wild-rice-lakes-dnr-wld

Table 6.5.4-3 Impaired Waterbodies Crossed by the 150-foot Rights-of-Way of the Application Alignments [1]			
Waterbody Name	**Impairment Parameter(s) [2]**	**Purple (No. of Crossings)**	**Blue (No. of Crossings)**
County Ditch 20	FishesBio; InvertBio	0	1
County Ditch 26	FishesBio; InvertBio	0	1
County Ditch 37	InvertBio	1	0
County Ditch 60	FishesBio; InvertBio	1	0
Crow River, North Fork	E.coli; FishesBio; Hg-F	1	1
Crow River, South Fork	E.coli; FishesBio; Hg-F; Nutrients; T	0	2
Grove Creek	DO; E.coli; FishesBio; InvertBio; T	1	1
Hawk Creek	Hg-F	5	0
Hazel Creek	E.coli; FishesBio; InvertBio	1	0
Johnson Creek (Meyer Creek)	E.coli	0	1
Judicial Ditch 15	FishesBio; InvertBio	0	1
Judicial Ditch 17	FishesBio	1	0
Judicial Ditch 18	FishesBio	0	1
Judicial Ditch 67	FishesBio; InvertBio	0	1
Judicial Ditch 9	FishesBio; InvertBio	0	1
Minnesota River	FC; Hg-F; InvertBio; T	1	0
Minnesota River	Hg-F; Nutrients; PCB-F; T	0	1
Mississippi River	FC; Hg-F; PCB-F	2	0
Mississippi River	Hg-F	0	2
Redwood River	Cl-; FC; FishesBio; Hg-F; InvertBio; T	1	0
Redwood River	FC; FishesBio; Hg-F; T	0	2
Sleepy Eye Creek	FC; FishesBio	0	1
Threemile Creek	Chlorpyrif; FC; T	1	0
Threemile Creek	FishesBio	1	0
Unnamed creek	InvertBio	2	2
Unnamed creek (Fairhaven Creek)	E.coli	1	0
Unnamed ditch	FishesBio; InvertBio	2	1
Unnamed ditch	InvertBio	1	0
Yellow Medicine River	Chlorpyrif; Hg-F; T	1	0

Table 6.5.4-3 Impaired Waterbodies Crossed by the 150-foot Rights-of-Way of the Application Alignments [1]			
Waterbody Name	**Impairment Parameter(s) [2]**	**Purple (No. of Crossings)**	**Blue (No. of Crossings)**
	Total Crossings	**26**	**28**

[1] Each occurrence of a water resource within the right-of-way is counted as a unique crossing.

[2] DO – dissolved oxygen; Chlorpyrif – chlorpyrifos; Cl- – chloride; E.coli – *Escherichia coli*; FC – fecal coliform; FishesBio – Fishes Bioassessment; Hg-F – mercury in fish tissue; InvertBio – aquatic macroinvertebrate bioassessments; Nutrients – nutrients / eutrophication; PCB-F – PCB in fish tissue; T – turbidity; TSS – total suspended solids

Impairment parameters identified within surface waters crossed by the routes' 150-foot rights-of-way are comprised of: chlorpyrifos (Chlorpyrif), chloride (Cl-), dissolved oxygen (DO), *Escherichia coli* (E.coli), fecal coliform (FC), fishes bioassessment (FishesBio), mercury in fish tissue (Hg-F), aquatic macroinvertebrate bioassessments (InvertBio), nutrients / eutrophication (Nutrients), PCB in fish tissue (PCB-F), turbidity (T), and total suspended solids (TSS). The majority of impairment parameters occur along both the Purple and Blue Routes' 150-foot rights-of-way. The exception is that the Chlorpyrif and Cl- Impairment Parameters are only found in waters along the Purple Route and Nutrients Impairment Parameter is only found in waters along the Blue Route. The Purple Route crosses two fewer impaired streams than the Blue Route.

The state of Minnesota has implemented a Mercury reduction initiative and plans to reduce Mercury release by 2025. The plan is based on The Minnesota Statewide Mercury TMDL Report (MPCA, 2007), which addresses mercury in waterbodies throughout Minnesota. The Report attributes 99 percent of mercury load to Minnesota's lakes and streams to atmospheric deposition. Mercury in fish tissue (Hg-F) was documented as an Impairment Parameter in waters crossed by both the Purple and Blue Routes' 150-foot rights-of-way. The Purple Route crosses two fewer Mercury impaired stream segments than the Blue Route.

6.5.4.2 Floodplains

The Purple and Blue Routes cross Federal Emergency Management Administration (FEMA) designated 100-Year and 500-Year floodplains. FEMA-designated 100-Year floodplains are associated with specific waterbodies along the route options. 500-Year floodplains are less prevalent and primarily located along wide, bottom-land terraces associated with large rivers along the route options. Table 6.5.4-4 provides the total acres of FEMA designated floodplains that would be crossed by the 150-foot right-of-way of the route options.

Table 6.5.4-4 FEMA Designated 100- and 500-Year Floodplain Areas Crossed by the 150-foot Rights-of-Way of the Application Alignments		
Floodplain Category	Purple Route 150-foot Right-of-Way Crossing (acres/percent)	Blue Route 150-foot Right-of-Way Crossing (acres/percent)
100-Year	45.6 / 1.5%	87.4 / 2.8%
500-Year	20.4 / 0.7%	4.9 / 0.2%

Waterbodies associated with the 100-Year floodplains within the 150-foot right-of-way of the Purple Route include the Mississippi River, Clearwater River, Crow River, Grove Creek, two unnamed perennial ditches, one unnamed intermittent ditch, Hawk Creek, Minnesota River, one unnamed stream, Yellow Medicine River, Threemile Creek, Redwood River, Meadow Creek, and Cottonwood River. Waterbodies associated with the 100-Year floodplains within the 150-foot right-of-way of the Blue Route include the Mississippi River, Crow River, Half Moon Lake Creek, three unnamed perennial streams, Grove Creek, Crow River (South Fork), Minnesota River, Redwood River, and Cottonwood River.

Waterbodies associated with the 500-Year floodplains within the 150-foot right-of-way of the Purple Route include the Minnesota River, one unnamed intermittent stream, and Meadow Creek. Waterbodies associated with the 500-Year floodplains within the 150-foot right-of-way of the Blue Route include the Mississippi River.

6.5.4.3 Lakes, Rivers, Streams, and Ditches Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact lakes, rivers, streams, ditches, and floodplains if these features cannot be avoided through project design. During construction, disturbance of soils and vegetative cover could affect water quality in adjacent water resources.

Watersheds

No impacts to the overall function of watersheds are expected. Any impacts that may occur from installation of structure foundations would be minimal and localized and would not affect the overall watersheds. No mitigation is proposed.

Lakes, Rivers, Streams, and Ditches

The Routes identified by the Applicant avoid and minimize impacts to lakes, rivers, streams, and ditches to the extent practicable. The Project is designed to span waterbodies such that no impacts to the bed and bank would occur; however, tree clearing within the right-of-way will occur during construction and operation of the

transmission line. Substations proposed as part of the Project would be sited to avoid impacts on lakes, rivers, and streams.

The Applicant will continue to coordinate with applicable agencies regarding transmission line crossings of waterbodies, including Public Waters and Section 10 Waters.

An NPDES permit from the MPCA will be obtained by the Applicant for construction of the Project. The Applicant will also develop a SWPPP that complies with MPCA rules and guidelines. All waterways crossed would be maintained for proper drainage through the use of temporary culverts or other temporary crossing devices, according to BMPs and permit requirements. If tree removal is required along waterways, trees would be cut so that the root system is not disturbed to retain bank stability. Sediment barriers, such as silt fence, straw bales, and bio-logs, would be used along waterways and slopes during construction to protect from soil erosion and sedimentation and a temporary seed mix would be installed where appropriate to support bank stabilization during restoration activities. Additionally, if new access roads for vehicles and equipment are required, access roads would be selected to avoid disturbance to stream banks. No permanent impacts to waterbodies are anticipated.

Water Quality Standards

Short-term, minor water quality impacts may occur during the construction of the proposed Project even though mitigation measures will be implemented to prevent sedimentation. Of the impaired waters crossed by the transmission line, the only applicable parameter is turbidity and TSS, since transmission lines would span the waterway and construction of the Project would not impact the bed and banks. These impacts would be associated with the soils from areas disturbed during construction being washed by stormwater into adjacent waters during rainstorm events. Increased turbidity and localized sedimentation of the stream bottom may occur from the runoff. If any of these events occur, however, these impacts would be temporary and would not significantly alter water quality conditions due to appropriately installed BMPs, such as silt fence or straw bales, and the minimal soil disturbance that occurs in any one location during construction of the Project.

Mitigation measures will be implemented to prevent or minimize surface water impacts. The MPCA, through the NPDES under the CWA, regulates construction activities that may impact stormwater runoff. An NPDES permit is required for construction activity disturbing: 1) one acre or more of soil; 2) less than one acre of soil, but part of a "larger common plan of development or sale" that is greater than one acre; or 3) less than one acre of soil, but that the MPCA determines poses a risk to water resources.

As discussed above, the Applicant will apply for an NPDES permit from the MPCA and will develop a SWPPP that will identify BMPs to be implemented during construction to minimize erosion and sedimentation impacts to surface waters. Erosion and sedimentation abatement measures such as silt fence and straw bales, for example, would be employed to decrease impacts to the hydrology of the Project area. No fueling or maintenance of vehicles or application of herbicides would occur within 100 feet of streams, ditches, and waterways to protect against introduction of these materials into surface or groundwater systems. Materials such as fuels, lubricants, paints, and solvents required for construction would be stored away from surface water resources according to appropriate regulatory standards. Any spills or leaks would be cleaned up immediately and leaking equipment removed from the area for proper maintenance.

Floodplains

The Project may require that transmission line structures be placed within FEMA-designated 100-year or 500-year floodplains. The placement of transmission line structures in floodplains are not anticipated to alter the flood storage capacity of the floodplain based on the minimal size of individual transmission line structures. Additionally, placement of transmission line structures within a floodplain would not impact the integrity of the structure.

The Project will be designed to span waterbodies and floodplains where practicable and to minimize the number of structures in surface water resources where these resources cannot be spanned.

Substations would not be sited within floodplains; therefore, no impacts on floodplains are anticipated from construction and operation of the substations proposed as part of this Project and no mitigation measures are proposed.

6.5.5 Wetlands

Wetlands are areas with hydric (wetland) soils, hydrophilic (water-loving) vegetation, and wetland hydrology (inundated or saturated much of the year). Wetlands are part of the foundation of water resources and are vital to the health of waterways and communities that are downstream. Wetlands detain floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing, hunting, agriculture, and recreation. 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.

The USFWS National Wetlands Inventory (NWI), as updated by the MNDNR, was reviewed to assess the presence of wetlands along the route options. Wetland complexes and small isolated wetlands are present throughout the 150-foot rights-of-way for each proposed route option. Wetlands are more prevalent in the northeast portions of the Purple and Blue Routes and are lesser in the southwest portions of the route options. Many of the wetlands are associated with riverine and floodplain ecosystems or are in localized depressions. Table 6.5.5-1 summarizes the wetlands present along the Purple and Blue Routes.

In addition to rivers, streams, and lakes, wetlands may also be designated as Public Waters in Minnesota (Minn. Stat. § 103G.005, subd. 15). As described in Section 6.5.4, these waters are listed in the PWI and meet the criteria set forth in Minnesota Statute, Section 103G.005, Subdivision 15. The MNDNR PWI dataset was reviewed to identify PWI Wetlands within the route options. A Minnesota Public Waters Work Permit is required for any impacts below the ordinary high water mark to PWI Wetlands on private lands.

Table 6.5.5-1 Wetlands Within the 150-foot Rights-of-Way of the Application Alignments

Wetland Feature	Purple Route (acres/percent)	Blue Route (acres/percent)
Total Right-of-Way	3,100.1/100%	3,160.8/100%
Total Wetland	135.1/4.4%	151.6/4.8%
Palustrine Emergent (PEM) Wetland Community	101.6/3.3%	96.2/3.0%
Palustrine Scrub-Shrub (PSS) Wetland Community	5.1/0.2%	14.1/0.4%
Palustrine Forested (PFO) Wetland Community	17.5/0.6%	17.3/0.5%
Shallow Open Water/Non-vegetated Aquatic Community	16.3/0.5%	18.7/0.6%
MNDNR PWI Wetlands	12.8/0.4%	6.9/0.2%

6.5.5.1 Impacts and Mitigation – All Routes

Transmission line and substation 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. If permanent facilities or impervious surfaces are placed in wetlands this would result in a total loss of wetland functionality and potentially affect water resources downstream.

Impacts to wetlands will be avoided or minimized to the extent practicable. The Applicant will design the Project to span wetlands where feasible and substations will be sited to avoid impacts to wetlands. Where impacts to wetlands cannot be avoided by

transmission line structures and clearing of trees within the 150-foot-wide right-of-way, several mitigation strategies can be implemented, including:

- Scheduling construction during frozen conditions;
- Use of construction mats when construction during frozen conditions is not feasible;
- Use of all-terrain construction equipment that is designed to minimize soil impact in damp areas;
- Use of the shortest route to the pole location in the wetland; and
- Assembling structures in upland areas, when feasible, before they are brought to the site for installation.

Temporary dredge and fill impacts to wetlands due to installation of construction matting and grading activities to support structure installation activities will be restored as required by the USACE permit requirements. Permanent wetland fill (loss) due to the installation of structure foundations will be mitigated for as determined through consultation with the USACE.

Trees located within the right-of-way pose a hazard to the structural integrity of the transmission line, which could cause harm to the operation of the transmission line or put the general public in danger. Vegetation maintenance under transmission lines prohibits the establishment of trees or removal of existing trees throughout the right-of-way. Tree removal includes those in forested wetlands. Additional mitigation for community type conversion will be determined through consultation with USACE. Additional discussion about potential impacts to trees and other woody vegetation is presented in Section 6.5.6.

The Applicant will obtain all appropriate permits and approvals from the USACE, MNDNR, local government unit(s), and watershed districts (if necessary) for any actions determined to occur in wetlands.

6.5.6 Flora

As discussed in Section 6.1, both route options lie within both the Prairie Parkland Province and the Eastern Broadleaf Forest Province as defined by the ECS of Minnesota (MNDNR, 2023b). More specifically, the majority of both route options lie within the Minnesota River Prairie Subsection. Prior to European settlement, this subsection was predominantly tallgrass prairie, with many islands of wet prairie. Forests of silver maple, elm, cottonwood, and willow grew on floodplains along the Minnesota River and other streams. Portions of the Big Stone Moraine supported dry and dry-mesic prairie. There were also dry gravel prairies on kames. Vegetation in these areas is

now dominated by agriculture; tallgrass prairie remnants are rare and isolated (MNDNR, 2023b).

A smaller portion of both route options falls within each of the Anoka Sand Plain, Coteau Moraines, and Hardwood Hills ecological subsections. A broad, flat, sandy lake plain dominates the majority of Anoka Sand Plain Ecological Subsection and forms the eastern and northern boundaries (MNDNR 2023b). Historically, the predominant vegetation was oak savanna and upland prairies surrounded by varied wetland complexes. Today, urban development and agriculture (primarily sod and vegetable crops), which occurs in about one-third of the subsection, has resulted in the loss of prairie and savanna and drainage of peatlands (MNDNR 2023b; MNDNR 2006).

Historically, tallgrass prairie covered virtually all of the Coteau Moraines subsection. Wet prairies covered a much smaller proportion of the landscape than in the Minnesota River Prairie subsection and were restricted to narrow stream margins. Forest was similarly restricted to ravines along a few streams, such as the Redwood River (MNDNR 2023b). Today, agriculture is the predominant land use in this subsection, with few remnants of pre-settlement vegetation left.

The Hardwood Hills subsection historically consisted of irregular topography and presence of numerous lakes and wetlands which provided a partial barrier to fire, resulting in woodland or forest rather than prairie vegetation. A mosaic of tallgrass prairie, aspen-oak land, and oak openings or savanna was present along the prairie boundary to the west (MNDNR, 2023b). Mixed forests of oaks, sugar maple, basswood, and other hardwoods were present in fire protected sites farther east. Tallgrass prairie grew on more level terrain within the subsection. Today, agriculture is the dominant land use. While many wetlands have been drained, many potholes remain and provide habitat for waterfowl and shorebirds. Important areas of forest and prairie exist throughout the subsection, but they are small and fragmented (MNDNR, 2023b; MNDNR 2006).

Lastly, the Purple Route Option also crosses a small portion of the Big Woods Ecological Subsection. At the time of European settlement, oak (*Quercus* spp.) woodland and maple-basswood forests dominated, and elm, basswood (*Tilia* spp.), sugar maple (*Acer saccharum*), and aspen (*Populus* spp.) were common. Vegetation in this subsection is now dominated by cropland and pasture, and less than 15% remains as upland forest or wetland (MNDNR, 2023b).

Agricultural areas found within the Project Study Area include active row crop fields interspersed with wind breaks, woodlots, fence rows, and grassland swales associated with drainage ditches. Suitable habitat for a variety of at-risk plant and animal species may be present in these areas.

Refer to section 6.3.1 for more information on CREP and RIM easements crossed by the two route options. Section 6.6.2 discusses SOBS and NPCs as they relate to each route option.

6.5.6.1 Impacts and Mitigation – All Routes

Transmission line and substation projects have the potential to impact existing vegetation through temporary, construction-related impacts to vegetative cover and/or long-term impacts that result in a conversion to a different vegetative cover (e.g., forested land that is converted to open herbaceous land). Removal of vegetative cover exposes soils and could result in soil erosion that, if not managed properly, could cause sedimentation in adjacent water resources. Temporary or permanent removal of vegetation also has the potential affect habitat for wildlife. In addition, construction vehicle traffic between project areas could lead to the introduction or spread of invasive species and noxious weeds.

The acreage of each land cover type crossed by the route options is provided in Section 6.2.9 (refer to Figure 6.2.9-1). Impacts to flora along the two route options will primarily be associated with impacts to agricultural areas; see Section 6.3.1 for a discussion of impacts and mitigation measures that would be used in cropland and pasturelands. Other impacts to flora may be related to wind breaks, woodlots, fence rows, grassland swales, and other areas that may provide suitable habitat for a wide range of wildlife, including protected species.

Construction of the Project will result in short-term adverse impacts on existing vegetation, including localized physical disturbance and soil compaction. Soil compaction can limit revegetation success, therefore Xcel Energy will decompact soils as part of Project restoration. Construction of substation facilities is anticipated to impact approximately 20 to 40 acres of vegetation. Construction activities involving establishment and use of access roads, staging, and stringing areas would also have short-term impacts on vegetation by concentrating surface disturbance and equipment use.

Construction would also result in long-term impacts on vegetation by permanently removing vegetation at each structure and within portions of the right-of-way that are currently dominated by forest or other woody vegetation. The Applicant would permanently convert forested areas and shrub lands to low-stature vegetation by clearing woody vegetation throughout the entire right-of-way where it occurs. Impacts to woody vegetation will be minimized to the extent possible by routing to avoid areas where this vegetation type occurs. Vegetation impacts at substation sites would be permanent and existing land cover would be converted to industrial use for the life of the facility.

Construction of the Project could lead to the introduction or spread of invasive species and noxious weeds. Construction activities that could potentially lead to the introduction of invasive species include ground disturbance that leaves soils exposed for extended periods, introduction of topsoil contaminated with weed seeds, vehicles importing weed seed from a contaminated site to an uncontaminated site, and conversion of landscape type, particularly from forested to open settings. The Applicant will implement measures to avoid the spread of invasive species and noxious weeds by implementing equipment inspections, ensuring equipment arrives to the site free of noxious weeds, and introducing a cover crop to avoid exposed soils for an extended period of time.

The primary means of minimizing impacts to vegetation is to minimize tree clearing through prudent routing. Avoidance can be achieved, in part, by using existing infrastructure rights-of-way (e.g., roadway, transmission line) such that tree removal is minimized. Avoidance can also be accomplished by spanning plant communities.

While the entire right-of-way will be cleared for construction, impacts to vegetation can also be mitigated by other strategies, including (1) replanting compatible vegetation at the edge of the transmission line right-of-way, (2) limiting vehicle traffic to public roads along the right-of-way, and (3) avoiding the introduction of invasive species and noxious weeds on equipment or through seeds or mulches.

To minimize the potential for the introduction or spread of noxious weeds and invasive species, the Application will use the following BMPs during construction:

- Disturbed areas will be revegetated using weed-free seed mixes and weed-free straw and hay for erosion control.
- Invasive species/noxious weeds will be removed via herbicide or manual means in accordance with the easement conditions and landowner restrictions.
- Where possible, the right-of-way may be mowed before noxious weeds and invasive species go to seed, if present.
- Construction vehicles will be inspected and cleaned to remove dirt, mud, plants, and debris from vehicles prior to arriving at and leaving construction sites.

These BMPs will be included in the Project's VMP, which the Applicant will prepare in coordination with applicable agencies prior to construction; a draft of the VMP is provided in Appendix K. Furthermore, Xcel Energy, in coordination with landowners, will implement integrated vegetation management plans associated with its existing pollinator initiative, which was created to enhance pollinator habitat; these plans

minimize chemical use by avoiding broadcast applications, and employ spot treatments for control of invasive species. See Section 5.0 for a discussion of construction methods and operation and maintenance procedures, and Section 6.6 for a discussion of potential impacts to protected species.

6.5.7 Fauna

The wildlife species that inhabit the Project Study Area are typical of those found in agricultural, rural, exurban, and suburban areas. Wind breaks, woodlots, fence rows, and grassland swales associated with farmsteads provide habitat for a variety of wildlife species, as do areas of non-forested wetland, upland deciduous hardwood forest, oak savanna, and lowland deciduous forest. Species common to the Project Study Area are shown in Table 6.5.7-1 (MNDNR, 2023f). These species are well-adapted for the dominant agricultural and developed habitats in the Project Study Area.

Table 6.5.7-1 Wildlife Species Common to the Project Study Area

Common Name	Scientific Name
Mammals	
Red fox	*Vulpes vulpes*
Northern racoon	*Procyon lotor*
Striped skunk	*Mephitis mephitis*
Beaver	*Castor canadensis*
River otter	*Lontra canadensis*
White-tailed deer	*Odocoileus virginianus*
Gray squirrel	*Sciurus carolinensis*
Coyote	*Canis latrans*
Eastern cottontail	*Sylvilagus floridanus*
Birds	
Wild turkey	*Meleagris gallopavo*
Mallard	*Anas platyrhynchos*
Blue-winged teal	*Anas discors*
Wood duck	*Aix sponsa*
Ring-necked pheasant	*Phasianus colchicus*
American robin	*Turdus migratorius*
Common yellowthroat	*Geothlypis trichas*
Red-winged blackbird	*Agelaius phoeniceus*
Brown-headed cowbird	*Molothrus ater*
Fish	

Table 6.5.7-1 Wildlife Species Common to the Project Study Area	
Common Name	**Scientific Name**
Large-mouth bass	*Micropterus salmoides*
Northern pike	*Esox lucius*
Bluegill	*Lepomis macrochirus*
Reptiles and Amphibians	
American toad	*Anaxyrus americanus*
Western chorus frog	*Pseudacris maculata*
Painted turtle	*Chrysemys picta*
Common garter snake	*Thamnophis sirtalis*

The National Audubon Society (NAS) works to identify, monitor, and protect habitat for bird species throughout the United States, in part by designating sites as Important Bird Areas (IBAs). IBAs provide essential habitat for one or more breeding, wintering, and/or migrating bird species. The IBA program is designed to be proactive, voluntary, participatory, science-based and works to identify, monitor, and conserve the most essential habitats for birds (NAS, n.d.).

Both the Purple and Blue Routes cross the Upper Minnesota River Valley IBA which extends along the Minnesota River Valley from Le Sueur in the northeast to Lac Qui Parle Lake. The river valley provides valley, floodplain, riparian, marsh and swamp habitats for a wide variety of resident and migratory bird species (NAS, 2013). This section of the Minnesota River Valley is also considered a Conservation Focus Area under the Wildlife Action Network (WAN). The WAN, which was developed for the MNDNR 2015-2025 Minnesota Wildlife Action Plan, is composed of mapped terrestrial and aquatic habitats, buffers, and connectors that represent a diversity of quality habitats that support Species in Greatest Conservation Need (MNDNR, 2023g).

Migratory birds are federally protected under the Migratory Bird Treaty Act (MBTA), and bald eagles are protected under the MBTA and Bald and Golden Eagle Protection Act (BGEPA) (USFWS, n.d.(a); USFWS, 2007). The MBTA protects migratory birds and most resident birds that are native to the U.S. from take (including killing, capturing, selling, trading, and transport). BGEPA protects and conserves bald eagles and golden eagles (*Aquila chrysaetos*) from intentional take of an individual bird, chick, egg, or nest, including alternate and inactive nests. Unlike the MBTA, BGEPA prohibits disturbance that may lead to biologically significant impacts, such as interference with feeding, sheltering, roosting, and breeding or abandonment of a nest (USFWS, 2007).

6.5.7.1 Impacts and Mitigation – All Routes

The introduction of a transmission line or substation may affect wildlife that occur in and adjacent to the facilities. Construction impacts would be associated with habitat conversion and vehicle collisions while operational impacts would be associated with wildlife collisions with maintenance vehicles, transmission lines, or substations.

A constraints analysis was conducted during the routing process to determine potential impacts to sensitive natural resources, including wildlife habitat (refer to Section 3.0). This analysis included a review of the WAN maps, sites with quality habitat or ecosystem function such as SOBS, NPCs, Lakes of Biological Significance, native prairie, river crossings, and crossings of forested areas where tree clearing would be necessary. Where possible, the Applicant designed routes to avoid these resources and will continue to coordinate with the MNDNR.

The Project would cross several distinct cover types which provide nesting, cover, and foraging habitat for a variety of wildlife species, including forested land, non-forested upland, wetlands, and open water. Refer to Sections 6.2.9, 6.5.4, and 6.5.5 for a discussion of impacts of the routes on these land cover types.

The construction, operation, and maintenance of the Project would be designed to minimize potential adverse impacts to wildlife resources, especially threatened and endangered plant and animal species, although no impacts to listed species are anticipated (refer to Section 6.6). The primary impact would be loss of habitat.

During active construction, wildlife would likely be displaced from the Project Study Area to seek shelter away from construction activities and workers. These impacts would be temporary; upon cessation of construction activities, wildlife use patterns in these areas would be restored. Construction could result in the mortality of less mobile animals, such as small rodents, reptiles, amphibians, and invertebrates; however, population level impacts would not be expected due to construction activities being limited and short term in nature along sections the right-of way. Depending on the season, construction could also disrupt bird courting or nesting, including destruction of nests, eggs, and chicks within the construction work area. Bats may be injured or killed if occupied trees are cleared during the active window, and may be disturbed during clearing or construction activities due to noise or human presence.

The Applicant will implement several construction BMPs that are beneficial to wildlife including: wildlife training for construction personnel, posted speed limits, spill prevention measures, and general construction housekeeping such as trash removal and maintaining a clean work area. Additionally, Xcel Energy will implement specific BMPs for state-listed species that will also be beneficial to wildlife in general. These include

coordinating tree removal to avoid species-specific clearing restrictions and implementing wildlife-friendly erosion control blankets Project-wide. Overall, construction of the Project is expected to have minimal impacts on individuals of common wildlife species, and no impact on populations of these species.

During operations, impacts to wildlife may be related to vehicle traffic and parking or maintenance of the transmission line right-of-way. However, the greatest risk to wildlife is associated with injury or death of bird species from collisions with the transmission line. These impacts often involve waterfowl or other large birds. The Applicant will coordinate with MNDNR and USFWS to identify any wildlife migration pathways, particularly avian flyways crossed by the route options and to identify areas where the line should be marked to minimize avian interactions. In addition, avian protection from electrocution can also be achieved by increasing phase to phase, and phase to neutral/ground spacing to a dimension large enough to prevent the bird from completing a circuit with its body. Other methods of achieving protection include the use of insulation or guarding of energized elements of the system (e.g., insulated wire, tubing/tape, insulator guards, wildlife caps) and the control of where birds perch (i.e., perch deterrents). Additionally, the substations sites will introduce an electrocution risk. Xcel Energy designs its transmission line facilities to comply according to Avian Power Line Interaction Committee (APLIC) recommended guidance to reduce the potential for avian electrocutions (APLIC, 2006; APLIC, 2012). Because any potential impacts on wildlife from electrocution are anticipated to be minimal and are not anticipated, no species-specific mitigation is proposed. However, Xcel Energy will implement several BMPs during operations including minimizing risk of vehicular collisions by posting speed limits, minimizing fire risk by utilizing spark arrestors on all electrical equipment and restricting smoking to designated areas, and implementing environmental training for employees. Xcel Energy will also continue to coordinate with MNDNR.

6.6 RARE AND UNIQUE NATURAL RESOURCES

6.6.1 Threatened and Endangered Species

The Applicant reviewed the USFWS Information for Planning and Conservation (IPaC) website (USFWS, 2023a) for a list of federally listed threatened and endangered species, candidate species, and designated critical habitat that may be present within the Project Study Area. Federally listed threatened, endangered, and candidate species are identified in Table 6.6-1 and official species lists for the routes are included in Appendix E. There are no designated critical habitats crossed by the route options.

The MNDNR's Natural Heritage Information System (NHIS) was also reviewed for documented occurrences of federally listed species and state-listed species within one mile of the Project Area (MNDNR, 2022; Table 6.6-1). The MNDNR maintains the

NHIS database through its Natural Heritage Program and Nongame Game Research Program; the NHIS is the most complete source of data on Minnesota's rare, endangered, or otherwise significant plant and animal species, plant communities, and other rare natural features. Although these reviews do not represent a comprehensive survey, they provide information on the potential presence of rare and unique species and habitats. The NHIS information provided here is based on a query of licensed NHIS data (per MNDNR license agreement; MNDNR, 2022); in addition, a Natural Heritage Review Request will be submitted to the MNDNR via the MNDNR's Minnesota Conservation Explorer (MCE) online tool after the route permit proceedings are complete.

Refer to Table 6.6.1-1 for a list federally listed threatened and endangered species, candidate species, and designated critical habitat that may be present along the two route options (USFWS, 2023a). This table also identifies known occurrences of state-listed threatened and endangered species that may be present within one mile of each route option as identified by a review of the NHIS database.

Table 6.6.1-1 Federal and State-Listed Species Potentially Present Within One Mile of the Route Options					
Common Name	Scientific Name	Habitat [1]	Route	Status	
				State [2]	Federal [3]
Mammals					
Northern Long-eared Bat	*Myotis septentrionalis*	In winter, hibernates in caves and mines. In fall, swarms in forested areas surrounding hibernation sites. During late spring and summer, forages and roosts in upland forests (USFWS, 2022a)	Both	SC	END
Tricolored Bat	*Perimyotis sublfavus*	Forests and woodlots where they roost in live and dead leaf clusters (USFWS, 2023b)	Both	SC	PE
Birds					
Whooping Crane	*Grus americana*	Croplands and palustrine wetlands (USFWS, 2012)	Both	-	EXPN
Henslow's Sparrow	*Ammodramus henslowii*	Uncultivated grasslands and old fields with stalks for singing perches and a substantial litter layer	Blue	END	-
King Rail	*Rallus elegans*	Shallow freshwater, brackish, or saltwater marshes	Purple	END	-
Loggerhead Shrike	*Lanius ludovicianus*	Upland grasslands and sometimes in agricultural areas where short grass vegetation and perching sites such as hedgerows, shrubs, and small trees are found	Both	END	-
Mollusks					
Elktoe	*Alasmidonta marginata*		Purple	THR	-

Table 6.6.1-1 Federal and State-Listed Species Potentially Present Within One Mile of the Route Options					
Common Name	Scientific Name	Habitat [1]	Route	Status	
				State [2]	Federal [3]
Fluted-shell	*Lasmigona costata*	Sand or gravel substrates in small to large rivers with moderate to fast moving currents	Purple	THR	-
Mucket	*Actinonaias ligamentina*		Both	THR	-
Spike	*Eurynia dilatata*		Purple	THR	-
Salamander Mussel	*Simpsonaias ambigua*	Rivers and streams, found only under flat rocks or under ledges of rock walls	Purple	END	PE
Wartyback	*Quadrula nodulata*	Fine or coarse substrate in medium to large rivers with slow moving currents	Blue	THR	-
Yellow Sandshell	*Lampsilis teres*		Purple	END	-
Insects					
Monarch Butterfly	*Danaus plexippus*	Fields and parks where milkweed and native plants are common (MNDNR, 2023h)	Both	-	C
Poweshiek Skipperling	*Oarisma poweshiek*	Wet to dry native prairie	Both	END	END [4]
Reptiles and Amphibians					
Blanding's turtle	*Emydoidea blandingii*	Requires calm, shallow waters with rich, aquatic vegetation for foraging and adjacent sandy uplands for nesting	Both	THR	-
Plants					
Prairie Bush Clover	*Lespedeza leptostachya*	Mesic to dry-mesic prairie slopes.	Blue	THR	THR
Butternut	*Juglans cinerea*	Mesic hardwood forests, most common on river terraces above the active floodplain	Blue	END	-
Sullivant's Milkweed	*Asclepias sullivantii*	Mesic tallgrass prairies	Purple	THR	-

Table 6.6.1-1 Federal and State-Listed Species Potentially Present Within One Mile of the Route Options					
Common Name	Scientific Name	Habitat [1]	Route	Status	
				State [2]	Federal [3]
Waterhyssop	*Bacopa rotundifolia*	Bedrock outcrops, in small rainwater pools and along the margins of shallow prairie ponds	Purple	THR	-

[1] MNDNR, 2023h

[2] State Status: END – Endangered, THR – Threatened, SC – Special Concern,

[3] Federal Status: END – Endangered, THR – Threatened, PE – Proposed Endangered, EXPN – Experimental Non-essential Population

[4] This species is federally listed; however, the IPaC lists for the route options did not identify this species as a species that is known or expected to be near the Project area.

6.6.1.1 Federally Listed Species

Northern Long-eared Bat

The northern long-eared bat (NLEB) is medium-sized bat species that occurs across the eastern and central U.S. (Caceres and Barclay, 2000). The annual life history of the NLEB includes an inactive period when the species is hibernating and an active period when the species forages, raises its young, and breeds. In the Project area, hibernation generally occurs in caves and mines between October 1 and April 15 (USFWS, 2023c). In April, the species emerges from its hibernacula and moves to summer habitat. The NLEB has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles, with diet composition differing geographically and seasonally. (USFWS, 2022a). Adult females form breeding or maternity colonies that are variable in size, ranging from a few individuals to as many as 60 adults (Caceres and Barclay, 2000; USFWS, 2022a). During the summer, the species roosts in live and dead trees in cavities and crevices and under bark (Timpone et al., 2010). Most foraging occurs above the understory, 3 to 10 feet above the ground, but under the canopy on forested hillsides and ridges, rather than along riparian areas. Foraging also takes place over small forest clearings and water, and along roads (USFWS, 2022a). USFWS defines suitable forested/wooded habitat as containing potential roosts (i.e., live trees or snags greater or equal to 3 inches in diameter at breast height that have exfoliating bark, cracks, crevices, or cavities), as well as forested linear features such as wooded fencerows, riparian forests, and other wooded corridors. Individual trees may be suitable habitat when they exhibit characteristics of potential roost trees and are within 1,000 feet of other forested/wooded habitat (USFWS, 2023b). The NLEB is currently declining due to a disease that affects hibernating bats called white-nose syndrome (WNS).

The NLEB was listed as threatened under the Endangered Species Act (ESA) in 2015 (80 Federal Register [FR] 17974), and a special rule pursuant to section 4(d) of the ESA was finalized in 2016 (81 FR 1900) (4(d) Rule). On March 31, 2023, the species was reclassified to endangered (87 FR 73488, November 30, 2022; 88 FR 4908, January 26, 2023). The USFWS has developed several tools and guidance documents to assist stakeholders in assessing impacts, including a range-wide determination key which is discussed further in section 6.6.1.3 below.

The Project Study Area is primarily agricultural lands with only a small area of forested habitat (see Section 6.2.9); the landscape surrounding the Project Study Area is also dominated by agriculture. During their active season, NLEB may roost in the trees within the Project Study Area, but suitable habitat is generally anticipated to be limited.

Prairie Bush Clover

Prairie bush clover (*Lespedeza leptostachya*) is a federally threatened prairie plant. The prairie bush clover is a member of the Fabaceae (*Pea*) family and a midwestern "endemic" – known only from the tallgrass prairie region of the upper Mississippi River Valley; it is currently only found in small regions of Minnesota, Iowa, Illinois and Wisconsin, and currently there are 113 known extant populations across the four states (MNDNR, 2007; USFWS, 2021). Also known as slender-leaved bush-clover, the plant grows on one or more stems and is generally between 9 to 18 inches tall, although plants can grow up to 3 feet tall (USFWS, 1988; USFWS, 2021). The leaf is clover-like and comprised of three small leaflets; the plant often has a grayish or silver luster. Flowers are loosely arranged on an open spike, range in color from white or yellow-white to light pink with a magenta mark in the center, and bloom from mid-July to early September. (MNDNR, 2007; USFWS, 2021)

In southwestern Minnesota, prairie bush clover can be found on dry-mesic prairies on north or northwest-facing slopes with well drained soils. Populations are primarily restricted to remnant prairies that have persisted despite widespread conversion to cropland; the majority of populations in the state are found on prairies that were historically or are presently used for pasture (MNDNR, 2020). Threats to the species and remaining habitat include habitat conversion, herbicide use, climate change, dominant vegetation encroachment, drought, and hybridization. (MNDNR, 2020; USFWS, 1988; USFWS, 2021).

Tricolored Bat

On September 14, 2022, the USFWS, under the U.S. Department of the Interior (DOI), published a proposed rule to the FR proposing to list the tricolored bat (*Perimyotis subflavus*) as an endangered species under the ESA (87 FR 56381).

The USFWS is proposing the species for listing due to substantial declines in tricolored bat abundance across its range. The main threats to the species are the impacts of WNS, wind-energy-related mortality, the effects of climate change, and habitat loss and disturbance.

WNS has caused estimated tricolored bat population declines of 90-100 percent across 59 percent of its range, and nearly one third of the species' known hibernacula have been extirpated. Under current conditions (i.e., no increase in threats to the species), the USFWS believes by 2030, range-wide abundance would decline by 89 percent and the number of known winter colonies would decline by 91 percent (USFWS, 2022b).

Overall, the species requires a similar habitat to other listed bat species – they utilize both live trees and snags in deciduous hardwood forested areas. In spring, summer, and fall, the species may be found roosting among leaf clusters of live or recently dead deciduous hardwood trees. The species will also roost in Spanish moss and "bony beard" lichen (*Usnea trichodea*) in the southern and northern portions of the range, respectively (USFWS, 2023b). In winter, tricolored bats utilize caves and mines for hibernation; however, in the southern portions of its range where caves are not as abundant, the species will often hibernate in "road-associated" culverts (USFWS, 2023b).

As noted above, the tricolored bat is proposed to be listed as endangered, with a final listing decision expected by fall of 2023.

Salamander Mussel

On August 22, 2023, the USFWS, under the DOI, published a proposed rule to the FR proposing to list the salamander mussel as an endangered species under the ESA.

The salamander mussel is a small, thin-shelled species of freshwater mussel currently found across 14 U.S. States (Arkansas, Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, West Virginia, and Wisconsin) (USFWS, 2023d). The salamander mussel inhabits rivers and streams with fairly swift velocities but prefers shelter habitat with space under slab rock/bedrock crevice-type structures that are dark, where they are in contact with a solid surface, and where there is stability from swift current (USFWS, 2023d). The salamander mussel is the only freshwater mussel in North America that uses a non-fish host. The mudpuppy (*Necturus maculosus*), the only host for the salamander mussel, is a fully aquatic salamander species that tends to be present within the same habitat preferred by the salamander mussel during the summer and fall when female mudpuppies are guarding their nests under large flat rocks. The salamander mussel's larvae develop on the gills of the mudpuppy before falling off into the stream substrate (USFWS, 2023d).

Most of the remaining populations are subject to high risk from current and ongoing threats, including contaminants, landscape alterations, lack of connectivity, and host vulnerability; and are likely unable to withstand potential catastrophic events from accidental spills, discharges, and increased sedimentation related to oil and gas exploration and extraction; and are projected to be in low condition or functionally extirpated within 20 years due to these current and ongoing threats (USFWS, 2023d).

As noted above, the salamander mussel is proposed to be listed as endangered, with a final listing decision expected by fall of 2024.

Whooping Crane

In the Project area, the whooping crane is listed as an experimental, non-essential population. An experimental, non-essential population is a population that has been established within its historical range under section 10(j) of the ESA to aid recovery of the species. The USFWS has determined a non-essential population is not necessary for the continued existence of the species. For the purposes of consultation, non-essential experimental populations are treated as a proposed species on private land (no section 7(a)(2) requirements, but federal agencies must not jeopardize their existence (section 7(a)(4))).

Monarch Butterfly

On December 17, 2020, the USFWS published the result of its 12-month review of the monarch butterfly and determined that listing the species under the ESA was warranted but precluded. The species meets the criteria for listing as an endangered or threatened species, but the USFWS cannot currently implement the listing due to limited staff and/or funding and because there are other listing actions with a higher priority. The species is now a candidate for listing; however, candidate species are not protected under the ESA. In August 2023, the USFWS announced an updated listing decision timeline for the species; if listed, the proposed rule would be published in fall 2024 and final rule in fall 2025 (Sweeney, 2023).

6.6.1.2 State-listed Species

State-listed species with known occurrences within one mile of the two Application routes are shown in Table 6.6.1-1.

Henslow's sparrow

The Henslow's sparrow is an inconspicuous, secretive bird whose most distinctive feature is its large, relatively flat olive-colored head with dark stripes (MNDNR, 2023i). The species requires uncultivated grasslands and old fields with standing, dead vegetation and a substantial litter layer. Areas used one year may be abandoned the next year if the grass has become too long or too short. Nests are built at the base of grass clumps, and runways are constructed through the leaf litter for use in escaping predators. Females lay an average of 4-5 eggs and incubate them until they hatch in about 11 days. The young are fed by both parents and grow quickly, making it possible for a pair to raise two broods in a season (MNDNR, 2023j).

King rail

The king rail is a secretive marsh bird found in a variety of shallow freshwater, brackish, or saltwater marshes. A complex of wetland types is ideal for breeding as nesting sites are typically densely vegetated while drier areas are used for foraging (MNDNR, 2023k). Nests are usually placed in a clump of grass on a platform the birds have constructed. Vegetation surrounding the nest may be pulled over the nest to form a canopy. Only three summer observations of king rail have been reported between 1980-2008; as such, the king rail appears to be all but extirpated as a nesting species in Minnesota (MNDNR, 2023k).

Loggerhead shrike

The loggerhead shrike is a medium sized bird identified by a black mask through the eyes, a gray back, a white patch on otherwise black wings, and white outer tail feathers. In Minnesota, the species is a seasonal resident, nesting in shrubs, hedgerows, and small trees. Loggerhead shrikes can be found in both non-native and native grasslands, and utilize agricultural areas, hunting in short grasses in farmyards, cemeteries, and old fields. The species was once common in grassland habitats, but is now absent from much of its former range; in Minnesota, they are only consistently found in Dakota and Clay counties, with sporadic, scattered observations elsewhere. Threats to the species include tree encroachment on grasslands and a loss of shelterbelts and windrows due to increases in intensive row-cropping practices (MNDNR, 2018a).

Mollusks

Seven state-protected mussel species were identified from the review of the NHIS data. The federally proposed salamander mussel is discussed further in Section 6.6.1.1 above. Four of these species (elktoe, fluted-shell, mucket, and spike) are found in small to large rivers in sand or gravel substrate and prefer moderate to fast-moving waters, while the wartyback and yellow sandshell mussels are found in fine or coarse substrate and prefer slower currents (MNDNR, 2023l-q). The spike mussel can also be found in sand and gravel substrates in lakes and reservoirs; in these areas, it is found near outlets with swift moving currents (MNDNR, 2023o).

Poweshiek skipperling

Spike-rush (*Eleocharis elliptica*) has frequently been cited as the larval food plant of the Poweshiek skipperling based on an early report of egg-laying on this member of the sedge family (*Cyperaceae*) in Michigan (MNDNR, 2018b). However, observations in Minnesota and Wisconsin indicate that prairie grasses, especially prairie dropseed (*Sporobolus heterolepis*) and little bluestem (*Schizachyrium scoparium* var. *scoparium*), are

probably the most important larval hosts (MNDNR, 2018b). Poweshiek skipperling was once widespread and abundant in Minnesota; however there have been no confirmed sightings of the species in the state since 2007 (USFWS, 2019).

Blanding's turtle

The Blanding's turtle is characterized by a domed carapace and a bright yellow chin and throat. The species requires wetland complexes associated with rivers and streams with abundant aquatic vegetation for foraging; nearby upland areas with sandy soils are used for nesting. In Minnesota, the species utilizes a variety of wetland types and riverine habitats throughout the state. In southern Minnesota, female Blanding's turtles may nest in agricultural areas. Threats to the species include mortality crossing roads, habitat fragmentation, and degradation and loss of upland and wetland habitats (MNDNR, 2023r).

Plants

Five species of state-protected plants were identified from the review of the NHIS data. The federally listed prairie bush clover is discussed further in Section 6.6.1.1 above.

The Sullivant's milkweed is found in prairie habitats. Sullivant's milkweed is distinguished from other milkweed species by its hairless, smooth leaves. This species is at risk due to habitat loss and is now only found in remnant and isolated prairie habitats along railroad rights-of-way (MNDNR, 2021b).

The butternut is a mid to large sized forest tree that grows in mesic hardwood forests in loamy or alluvial soils or in sandy soil in areas where the water table is near the surface (MNDNR, 2018c). This species is most common on river terraces elevated several feet or more above the active floodplain, where it is protected from siltation and flood scouring. The main threat to the butternut is the spread of butternut crank, a fungal disease which attacks the cambium of the tree. The infected areas, called cankers, girdle the branches and trunks and cut off nutrients and water; eventually killing the tree. There is no known treatment or control for butternut canker (MNDNR, 2018c).

Waterhyssop is an aquatic species found primarily in small rainwater pools on bedrock outcrops and occasionally along the margins of shallow prairie ponds. Waterhyssop can also persist for a short period of time after the pools dry up and has been known to reappear on rare occasions in pools that refill after heavy rains in the fall (MNDNR, 2018d). Threats to the species include herbicide use, overgrazing, and rock quarrying.

6.6.1.3 Threatened and Endangered Species Impacts and Mitigation – All Routes

Construction and operation of transmission lines and substations have the potential to impact rare species and their habitats. Routing and siting these facilities to avoid sensitive habitats can avoid or minimize impacts to rare species.

Federally Listed Species

The USFWS has recently developed and implemented new tools called Determination Keys (Dkeys) in IPaC that can be used to streamline the consultation process. Dkeys are logically structured sets of questions designed to assist users in determining if a project qualifies for a pre-determined consultation outcome based on existing programmatic consultations or internal USFWS standing analyses. Each Dkey starts with a qualification interview to see if the key is appropriate for your project. There are two Dkeys available in IPaC for the Project:

- **The Minnesota-Wisconsin Federal Endangered Species Determination Key:** a tool to help Federal agencies and project proponents decide if their proposed action has the potential to adversely affect federally listed species and designated critical habitat on certain routine and predictable projects in Minnesota and Wisconsin. This key covers the following species expected to occur in the Project area: tricolored bat, monarch butterfly, prairie bush clover (Blue Route only) and whooping crane.
- **Northern Long-eared Bat Rangewide Determination Key:** this key is intended to streamline review of projects for potential effects to the NLEB.

The USFWS has also developed a fully public IPaC beta site that has all the same functionality as the live IPaC site that can be used for project planning and testing prior to submitting an official project in the live IPaC site. To conduct a preliminary review of potential impacts, Xcel Energy completed both Dkeys noted above for each Project Route using the IPaC beta site and the results are summarized in Table 6.6.1-2 below.

Table 6.6.1-2 Preliminary Determinations for Federal Species [1]

Common Name	Status	Route Option	Preliminary Determination
Northern Long-eared Bat (NLEB)	Endangered	Purple and Blue	Not Likely to Adversely Affect
Tricolored Bat	Proposed Endangered	Purple and Blue	Not Likely to Adversely Affect
Salamander Mussel	Proposed Endangered	Blue	TBD [2]
Prairie Bush Clover	Threatened	Blue	No Effect

Table 6.6.1-2 Preliminary Determinations for Federal Species [1]			
Common Name	**Status**	**Route Option**	**Preliminary Determination**
Whooping Crane	Experimental, Non-essential Population [3]	Purple and Blue	No Effect
Monarch Butterfly	Candidate	Purple and Blue	Not Likely to Adversely Affect

[1] Generated using IPaC beta site (https://ipacb.ecosphere.fws.gov/). Determination key inputs are preliminary and will be verified after a final route is selected by the Commission.

[2] Species recently proposed for listing on August 22, 2023; not yet included in Dkey.

[3] For areas outside of a National Wildlife Refuge or National Park, the USFWS treats the nonessential experimental population of whooping crane as proposed for listing; federal agencies must confer with the Service on actions that are likely to jeopardize the continued existence of a proposed species.

Impacts on individual NLEBs and tricolored bats may occur if clearing or construction take place when the species are breeding, foraging, or raising pups in its summer habitat. Bats may be injured or killed if occupied trees are cleared during the active window, and the species may be disturbed during clearing or construction activities due to noise or human presence. The preliminary determination shown in Table 6.6.1-2 for the NLEB is based on Dkey inputs, notably, that Xcel Energy would implement tree clearing activities during the NLEB's inactive season.

The primary habitat for the prairie bush clover is dry-mesic prairies on north or northwest-facing slopes with well drained soils. The Blue Route is dominated by agricultural (74 percent); however, as noted in Section 6.6.2 and Table 6.6.2-2 below, the Blue Route crosses 3.3 acres of dry or mesic prairie. The preliminary determination shown in Table 6.6.1-2 for the prairie bush clover (only applicable to the Blue Route) is based on Dkey inputs, notably, that the Project will not indirectly alter the habitat or resources of prairie bush clover and will not directly harm prairie bush clover. Xcel Energy would maximize the structure spacing to span suitable native prairie habitats; therefore, suitable habitat for this species would not be impacted.

No in-stream work will be required to construct the Project. The Applicant will implement appropriate BMPs to prevent erosion and sediment runoff and protect water quality, such as silt fence, straw bale, and other erosion control device installation as outlined in the Project SWPPP. As such, adverse impacts to the salamander mussel species are not anticipated.

Adult monarch butterflies feed on nectar from a wide variety of flowers. Reproduction is dependent on the presence of milkweed, the sole food source for larvae. As discussed above, the Project was designed to occur primarily in cultivated cropland. The Project

will also avoid woodlands, shrublands, grasslands, and water resources to the degree practicable. However, it is possible that the Project will have minor, temporary impacts to native vegetation serving as a food source to monarch butterflies; however, no long-term significant impacts to the species are anticipated.

State-listed Species

Xcel Energy submitted a letter to the MNDNR on May 25, 2023, requesting early coordination comments on the Project. The MNDNR responded on July 10, 2023, and directed Xcel Energy to use the NHIS Rare Features Data received under its License Agreement to avoid impacts to known occurrences of state-listed endangered and threatened species and nearby habitat. Further, to ensure compliance with state law regarding rare features, MNDNR directed Xcel Energy to request a Natural Heritage Review via the Minnesota Conservation Explorer.

Tree clearing may impact sensitive bird species if conducted during the breeding and nesting season. The Applicant will coordinate with the MNDNR to schedule vegetation clearing to avoid or minimize impacts to the state-listed loggerhead shrike.

No in-stream work will be required to construct the Project. The Applicant will implement appropriate BMPs as outlined in the Project SWPPP (e.g., silt fence, straw bales) to prevent erosion and sediment runoff and protect water quality. As such, adverse impacts to mussel species are not anticipated.

Suitable habitat for the Poweshiek skipperling includes wet to dry native prairie. Xcel Energy would maximize the structure spacing to span suitable native prairie habitats; therefore, suitable habitat for this species would not be impacted. In addition, although this species is also federally listed, the absence of this species from the IPaC list for the Project Area and the absence of this species during annual surveys conducted by the MNDNR at many sites where it was once known to occur further emphasize the unlikelihood that this species is present in the Project area (USFWS, 2023a; MNDNR, 2018b).

State-listed plant species are endemic either to mesic hardwood forest, mesic tall-grass prairie or bedrock outcrops. Suitable habitat for these species would be minimal or is not likely to be present along the proposed Project Routes as much of the area has been converted to agricultural use. As noted above, Xcel Energy would maximize the structure spacing to span suitable native prairie habitats. For areas where impacts to suitable habitat for state-listed plants are still possible, minimization and mitigation measures could include conducting surveys for rare features prior to construction, fencing of sensitive sites during construction, or special site restoration following construction.

Suitable habitat for the Blanding's turtle includes wetland and riverine habitats, and uplands (including agricultural areas) for nesting. The MNDNR has developed Recommendations for Avoiding and Minimizing Impacts to assist developers and contractors during construction within Blanding's turtle habitat (MNDNR, 2008). Xcel Energy will coordinate with the MNDNR to identify the appropriate conservation measures specific to the Project to avoid adverse impacts to this species.

The Applicant will work with the MNDNR to avoid adverse impacts to species and will implement appropriate, species-specific BMPs if Project activities will take place during any of the species' active season.

Substation proposed as part of the Project would be sited to avoid sensitive species and their habitats. No impacts on state-listed species are anticipated from construction or operation of the substations.

6.6.2 Natural Resource Sites

MBS Sites of Biodiversity Significance

Under the purview of the MNDNR, the Minnesota Biological Survey (MBS) "systematically collects, interprets, monitors and delivers data on plant and animal distribution as well as the ecology of native plant communities and functional landscapes." Once work in a region is complete, MBS assigns a rank of biodiversity significance to each survey site. These SOBS ranks are based on a variety of factors, including the presence and numbers of rare species populations, the quality (i.e., size and condition) of native plant communities within the site, and the site's context within the landscape (i.e., whether the site is isolated in the landscape or contiguous with or close to other areas with intact native plant communities) (MNDNR, 2023s). There are four biodiversity significance ranks: outstanding, high, moderate, and below. A rank of outstanding is assigned to those sites which contain the largest, most intact functional landscapes, and the best occurrences of the rarest plant and animal species. Table 6.6.2-1 lists the SOBS that are crossed by the 150-foot rights-of-way of the Purple and Blue Routes.

Table 6.6.2-1 Sites of Biodiversity Significance Crossed by the Route Options

Site of Biodiversity Significance	Rank	Acres of Crossing (150-foot Right-of-Way)	
		Purple Route	Blue Route
Amiret 11 Plus	Below	-	0.6
Amiret 13	Below	-	5.5
Amiret 16	Moderate	-	0.9

Table 6.6.2-1 Sites of Biodiversity Significance Crossed by the Route Options			
Site of Biodiversity Significance	Rank	Acres of Crossing (150-foot Right-of-Way)	
		Purple Route	Blue Route
Amiret 29 Plus	Moderate	-	5.1
Amiret 32	Moderate	-	0.4
Birch Cooley S. 3	Moderate	-	1.3
Clara City to Raymond Railroad Prairie	Moderate	<0.1	-
Clifton 7 (Clifton WMA)	Below	3.6	-
Daub's Lake WMA	Below	-	3.4
East Clear Lake 30	Below	-	1.3
East Clear Lake 33	Below	3.0	-
Fairview 12	Below	2.6	-
Fairview 13	Below	1.8	-
Fairview 13 - 14	Below	<0.1	-
Gales 14 North	Below	-	6.4
Gales 17	Moderate	-	39.6
Gennessee 5	Below	18.0	-
Hector - Bird Island Rr-Row	Moderate	-	0.9
Manannah 11	Below	2.1	-
Manannah 24 SW	Below	-	4.2
Sheridan 13, 24	Below	-	9.9
Sherman 17	Below	-	9.8
Sodus 21 Plus	Moderate	0.8	-
Sodus 3	Moderate	3.7	-
Sodus 32	Below	0.4	-
Sodus 3-4	Below	1.7	-
Sodus 4 SE	Below	<0.1	-
Sodus 4-9	Moderate	3.1	-
Sodus 8 - 9	Moderate	0.2	-
Stony Run 25	Moderate	0.8	-
Stony Run E. 29	Moderate	16.2	-
Tjosvold-Minsaas Hill Prairie	Moderate	2.6	-
West Clear Lake 9	Below	-	1.5
Total for Each Route Option		**60.8**	**90.8**

Native Plant Communities

The MNDNR also maintains records of locations of plant communities that are important areas of native vegetation or habitat. These NPCs are classified and defined by the MBS by considering the vegetation, hydrology, landforms, soils, and natural disturbance regimes associated with groupings of native communities. They are named for their characteristic environmental features or the characteristic plant species within them (MNDNR, 2023t). NPC types and subtypes are given a Conservation Status Rank that reflects the relative rarity and endangerment of the community type in Minnesota. Conservation Status Ranks range from S1 (critically imperiled) to S5 (secure, common, widespread, and abundant). Native plant communities with a Conservation Status Rank of S1 through S3 are considered rare in the state. Table 6.6.2-2 lists the NPCs that are crossed by the 150-foot rights-of-way of the Purple and Blue Routes.

Table 6.6.2-2 Native Plant Communities Crossed by the Route Options

Native Plant Community	Rank	Acres of Crossing (150-foot Right-of-Way)	
		Purple Route	Blue Route
MHs38b - Basswood - Bur Oak - (Green Ash) Forest	S3	-	2.7
MHs49 - Southern Wet-Mesic Hardwood Forest	(S2, S3)	-	1.9
PWL_CX - Prairie Wetland Complex	(S1, S2, S3)	0.2	0.3
UPs13d - Dry Hill Prairie (Southern)	S2	7.8	1.8
UPs23a - Mesic Prairie (Southern)	S2	<0.1	1.5
WPs54b - Wet Prairie (Southern)	S2	-	<0.1
Total for Each Route Option		**8.1**	**8.3**

Calcareous Fens

Calcareous fens are rare groundwater-fed wetlands that are sensitive to changes in water quality and quantity. Reductions in groundwater discharge or increases in surface water can cause damage to the fen community, both in terms of its condition and size. Based on review of MNDNR's data, there is one calcareous fen (Gennessee 21) located approximately 2.3 miles east of the Purple Route.

6.6.2.1 Purple Route

The Purple Route right-of-way crosses 18 SOBS, including 8 ranked as of Moderate Biodiversity Significance, and 10 ranked as Below. In addition, the Purple Route right-of-way crosses three NPCs with ranks ranging from S1 to S3 (refer to Tables 6.6.2-1

and 6.6.2-2). Based on review of MNDNR's data, there is one calcareous fen (Gennessee 21) located approximately 2.3 miles east of the Purple Route.

No SOBS, NPCs, calcareous fens, or public lands are within the substation siting areas along the Purple Route.

6.6.2.2 Blue Route

The Blue Route right-of-way crosses 15 SOBS, including 6 ranked as of Moderate Biodiversity Significance, and nine ranked as Below. In addition, the Blue Route right-of-way crosses six NPCs with ranks ranging from S1 to S3 (refer to Tables 6.6.2-1 and 6.6.2-2). No calcareous fens were identified within 5 miles of the Blue Route based on review of MNDNR's data.

No SOBS, NPCs, calcareous fens, or public lands are within the substation siting areas along the Blue Route.

6.6.2.3 Natural Resource Sites Impacts and Mitigation – All Routes

Construction and operation of transmission lines and substations have the potential to impact natural resources sites and interfere with the qualities that led to their designation as protected sites. Routing and siting these facilities to avoid areas designated as natural resource sites can avoid or minimize impacts to these features.

SOBS and NPCs are located within the Purple and Blue Routes and are primarily associated with major drainageways such as the Mississippi, Minnesota, and Cottonwood rivers. The Applicant conducted a review of the GIS shapefiles of the SOBS and NPCs as they relate to the route options.

Sensitive natural resources, such as SOBS, NPCs, native prairie areas, and the crossings of the Mississippi, North Fork of the Crow, and Minnesota Rivers, were included in the comparative analysis used to develop and refine routes (refer to Section 3.0). The Applicant met with the MNDNR on December 19, 2022, and March 16 and May 24, 2023, to discuss impacts to sensitive natural resources. In a letter dated May 25, 2023, the Applicant requested early coordination comments on the Project. The MNDNR provided comments in a letter dated July 10, 2023, recommending further review of certain areas along the routes to reduce impacts to sensitive areas; the Applicant refined several route options based on these recommendations. The MNDNR also directed Xcel Energy to use the NHIS Rare Features Data received under its License Agreement to avoid impacts to known occurrences of state-listed endangered and threatened species and nearby habitat. Further, to ensure compliance with state law regarding rare features, MNDNR directed Xcel Energy to request a Natural Heritage Review via the Minnesota Conservation Explorer. A Natural Heritage Review Request will be

submitted to the MNDNR via the MNDNR's MCE online tool after Route Permit proceedings are complete. The Applicant will continue to work with MNDNR to identify and minimize impacts to these sensitive resources.

Incorporating MNDNR coordination and other stakeholder feedback, where possible, the Applicant designed routes to avoid these resources. Where these areas could not be avoided, route alternatives were chosen, and construction techniques such as spanning will be utilized, to minimize impacts to these areas. Minimization and mitigation measures would include conducting surveys for rare features prior to construction, fencing of sensitive sites during construction, seasonal or time-of-year restrictions for conducting construction activities, or special site restoration following construction. Overall, no adverse impacts to rare or sensitive resources are anticipated.

Xcel Energy, in coordination with landowners, will implement integrated vegetation management plans associated with its existing pollinator initiative, which was created to enhance pollinator habitat; these plans minimize chemical use by avoiding broadcast applications, and employ spot treatments for control of invasive species.

6.7 UNAVOIDABLE EFFECTS

Environmental information required for a Route Permit application pursuant to Minn. Rule 7850.1900, subp. 3(G) includes a description of the human and natural environmental effects that cannot be avoided if the Project is approved by the Commission. The Applicant has developed the Project to avoid impacts to environmental resources whenever possible. In some cases, impacts to environmental resources cannot be entirely avoided, but could be minimized by implementation of mitigation measures. A detailed discussion of the environmental impacts of the proposed Project, as well as the mitigation measures that would be used to minimize impacts is presented in Sections 6.1 through 6.6 of this Application. Environmental impacts that would be minimized by the use of mitigation measures, but not entirely avoided, are provided below. Most of these unavoidable impacts would occur during construction of the Project and would resolve with the completion of construction.

Unavoidable impacts related to the Project that would last only as long as the construction period include:

- Increased traffic on roads that are in the vicinity of the Project and potential short-term traffic delays on public roadways.
- Visual disturbance to nearby residents and recreationalists.
- Noise emitted from vehicles and equipment during construction that will be audible to neighboring landowners and recreationalists.

- Temporary impacts to agricultural operations, such as crop losses and soil compaction and erosion.
- Vegetation clearing that could result in minor amounts of habitat loss.
- Temporary disturbance to and displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed during structure placement or other activities.
- Minor air quality impacts due to construction vehicle emissions and fugitive dust.

Unavoidable impacts related to the Project that would last as long as the life of the Project would include the following:

- Changes to existing aesthetics of landscape (from predominantly agricultural to transmission line or substation), which will be visible from local roadways and parcels.
- Physical impacts to land use and change in landcover where the permanent Project structures exist and/or where the right-of-way requires vegetation maintenance (e.g., forested lands).
- Injury or death of avian species that collide with, or are electrocuted by, conductors.
- Continued maintenance of tall-growing vegetation within the right-of-way to comply with NESC requirements.

In addition to the temporary and permanent impacts listed above, a commitment of people and resources would be required to successfully construct either of the route options. Some resources would be irreversibly committed to the Project and would be irretrievable, including trees cleared and maintained as such along the right-of-way. Resources committed would be similar for either route due to the same general area being crossed by each route.

6.8 ENVIRONMENTAL ANALYSIS OF THE GREEN SEGMENT

The Green Segment begins at the Sherco Substation within the municipal boundary of Becker in Sherburne County. The first 1.9 miles of the transmission line is within the municipal boundary of Becker. The line exits the municipal boundary at the intersection of 125th Avenue and River Road Southeast, where it turns west and continues to travel toward the Sherco Solar West Substation. The Green Segment is located entirely within the Anoka Sand Plain ecological subsection; a description of the environmental setting in this ecological subsection is provided in Section 6.1.1. Environmental features along

the Green Segment are similar to environmental features along the Purple and Blue Routes.

Table 6.8-1 describes the environmental features located along the Green Segment and the detailed maps in Appendix C show these features.

Table 6.8-1 Environmental Features Crossed by the Green Segment

Environmental Features	Unit	Green Segment
Route Length	Miles	3.1
150-foot Right-of-Way	Acres	57.4
NLCD Land Cover/Use in 150-foot Right-of-Way		
Agricultural Land	Acres	38.0
Developed Areas	Acres	16.8
Wetlands	Acres	0.0
Forested Lands	Acres	0.0
Non-forested Uplands	Acres	0.7
Barren Land	Acres	1.9
Open Water	Acres	0.0
Following Existing Transmission Line	Miles	1.0
Following Road or Rail, but not Transmission Line	Miles	1.2
Following Property Line, but not Transmission Line, Road, or Rail	Miles	0.0
Not Following Existing Linear Feature	Miles	0.9
Total Residences	**Number**	**2**
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	0
Residences within 300-500 feet	Number	2
Prime Farmland Soils	Acres	0 / 0%
Surface Water Resources within the 150-foot Right-of-Way		
Streams/Rivers/Ditches	Count	4
Lakes or Ponds	Count	0
PWI Watercourses	Count	0
PWI Basins	Count	0
USACE Navigable Waters (Section 10)	Count	0
Trout Streams	Count	0
Trout Lakes	Count	0
Minnesota Designated ORVWs	Count	0
Shallow Lakes	Count	0

Table 6.8-1 Environmental Features Crossed by the Green Segment		
Environmental Features	**Unit**	**Green Segment**
100-Year Floodplains	Acres/Percent	0.0 / 0%
500-Year Floodplains	Acres/Percent	0.0 / 0%
Wetlands within the 150-foot Right-of-Way		
Total Wetland Area	Acres	0.0
PEM Wetland Community Area	Acres	0.0
PSS Wetland Community Area	Acres	0.0
PFO Wetland Community Area	Acres	0.0
Shallow Open Water / Non-vegetated Aquatic Community Area	Acres	0.0
PWI Wetlands	Count	0
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	0
NPCs in 150-foot Right-of-Way	Number	0

To accommodate the second 345 kV circuit on the Green Segment, davit arms will be installed on the existing Line 5651 structures and eight new structures will be installed adjacent to the existing Line 5651 dead-end structures. All work will be conducted within the 150-foot right-of-way of Line 5651 and no additional temporary workspace will be needed.

According to the NLCD data, land cover within the 150-foot right-of-way of the Green Segment is a mixture of agricultural land, developed land, non-forested uplands, and barren land (Dewitz and USGS, 2021). However, construction and operation of Line 5651 has converted the land use within the Green Segment to a maintained utility corridor. The Green Segment parallels property lines and roadways for the entirety of its length.

The first 1.9 miles of the Green Segment are located in the City of Becker in an area zoned as Power Generation and General Industrial. The line exits the municipal boundary of Becker at the intersection of 125th Avenue and River Road Southeast, where it turns west and continues to travel through Becker Township toward the Sherco Substation, in an area zoned as Agricultural. No conflicts with existing zoning are anticipated for the Green Segment and no mitigation measures are proposed for this portion of the Project.

Two residences are located between 300 and 500 feet of the Green Segment. No new right-of-way would be necessary for the Green Segment; therefore, no impact on residences is anticipated and no mitigation measures are proposed. The Green Segment would be added to existing transmission structures and the new structures will be

installed adjacent to existing dead-end structures. While installation of new structures would create additional visual impact, such impacts would be minor and similar to the existing environment along the Green Segment.

No lakes, rivers, or streams occur within the right-of-way of the Green Segment, but approximately four roadside ditches are crossed by the Green Segment. No wetlands are present within the right-of-way of the Green Segment and the Green Segment does not cross FEMA-mapped floodplains. Only minimal ground disturbance would occur during installation of the davit arms and stringing the Green Segment along the existing Line 5651. Installation of the new structures would require ground disturbance, but these structures would not be installed within roadside ditches. Therefore, impacts on roadside ditches crossed by the Green Segment would be negligible and temporary. The Applicant would use the same construction and mitigation measures as are described for the Purple and Blue Routes in Sections 6.2 and 6.3.

The Sherburne County Snowmobile Trail is crossed three times by the existing 150-foot right-of-way of the Green Segment. No additional lands used for public recreation are located within the 150-foot right-of-way of the Green Segment.

Only minimal vegetation clearing is anticipated to construct the Green Segment; vegetation clearing would be greatest where the new structures are installed. There are four federally listed species that may be present near the Green Segment (NLEB, tricolored bat, whooping crane, and monarch), and two state-listed species with known occurrences within one mile of the Green Segment: loggerhead shrike (discussed above in Section 6.6.1) and rock sandwort. Rock sandwort is a small plant, growing to a maximum height of 8 inches, and is found on horizontal outcrops of sedimentary bedrock exposures in the southeastern region of Minnesota. Habitats tend to be small in size and isolated from one another (MNDNR, 2018e). Rock sandwort grows in crevices and in very shallow accumulations of organic matter over the exposed bedrock, and thus has very shallow root systems. Due to the small size of known habitats and the few numbers of individuals occurring at these sites, management of competing use in areas of known populations is critical (MNDNR, 2018e).

As noted above, there is no forested land present along the Green Segment, and only minimal vegetation clearing is anticipated; therefore, construction of the Green Segment would have minimal impacts to federal and state-listed species.

6.9 ENVIRONMENTAL ANALYSIS OF CONNECTOR SEGMENTS

In addition to the proposed route options, the Applicant conducted an analysis of the environmental features along each of the identified connector segments. Figure 4.5-1

in Section 4.5 provides an overview of the connector segments in relation to the route options.

6.9.1 Connector Segment A

Connector Segment A is in Harvey Township in Meeker County within the Minnesota River Prairie ecological subsection (refer to Section 6.1 for a detailed description of this ecological subsection) and, as such, environmental features along the connector segment are similar to environmental features along the Purple and Blue Routes. Table 6.9.1-1 describes the environmental features located along Connector Segment A and the detailed maps in Appendix C show the environmental features along this connector segment.

Table 6.9.1-1 Environmental Features Crossed by Connector Segment A

Environmental Features	Unit	Connector Segment A
Route Length	Miles	1.5
150-foot Right-of-Way	Acres	26.9
NLCD Land Cover/Use in 150-foot Right-of-Way		
Agricultural Land	Acres	26.5
Developed Areas	Acres	0.4
Wetlands	Acres	0.0
Forest Lands	Acres	0.0
Non-forested Uplands	Acres	0.0
Barren Land	Acres	0.0
Open Water	Acres	0.0
Following Existing Transmission Line	Miles	0.0
Following Road or Rail, but not Transmission Line	Miles	0.0
Following Property Line, but not Transmission Line, Road, or Rail	Miles	1.5
Not Following Existing Linear Feature	Miles	0.0
Total Residences	**Number**	**0**
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	0
Residences within 300-500 feet	Number	0
Prime Farmland Soils	Acres	24.5 / 91%
Surface Water Resources within the 150-foot Right-of-Way		
Streams/Rivers/Ditches	Count	1
Lakes or Ponds	Count	0

Table 6.9.1-1 Environmental Features Crossed by Connector Segment A		
Environmental Features	**Unit**	**Connector Segment A**
PWI Watercourses	Count	0
PWI Basins	Count	0
PWI Basins over 1,000 feet [2]	Count	0
PWI Wetlands	Count	0
PWI Wetlands over 1,000 feet [2]	Count	0
USACE Navigable Waters (Section 10)	Count	0
Trout Streams	Count	0
Trout Lakes	Count	0
Minnesota Designated ORVWs	Count	0
Shallow Lakes	Count	0
100-Year Floodplains	Acres/Percent	0.0 / 0%
500-Year Floodplains	Acres/Percent	0.0 / 0%
Wetlands within the 150-foot Right-of-Way		
Total Wetland Area	Acres	0.3
Palustrine Emergent (PEM) Wetland Community Area	Acres	0.3
Palustrine Scrub-Shrub (PSS) Wetland Community Area	Acres	0
Palustrine Forested (PFO) Wetland Community Area	Acres	0
Shallow Open Water / Non-vegetated Aquatic Community Area	Acres	0
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	0
NPCs in 150-foot Right-of-Way	Number	0

Connector Segment A predominantly crosses agricultural land and Approximately 91 percent of the acres in the 150-foot right-of-way of Connector Segment A are categorized as prime farmland. This connector segment parallels property lines and agricultural field edges for the entirety of its length, which would minimize impacts to farming operations. For example, where the transmission line follows property and field lines, monopoles would typically be constructed on the property line with a typical spacing of 1,000 feet between structures, which would provide sufficient room for farming machinery to maneuver around transmission line structures. Two residences are located within 300 to 500 feet of the connector segment, where it converges with the Blue Route on the east side of State Highway 22. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Sections 6.2 and 6.3.

The connector segment crosses one waterbody and 0.3 acre of wetland would be within the 150-foot right-of-way. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Sections 6.5.4 and 6.5.5.

Construction of Connector Segment A would have similar impacts to flora and fauna as those discussed in Sections 6.5.6 and 6.5.7 for the Purple and Blue Routes. The potential impacts of Connector Segment A on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the route options in Sections 6.6.1 and 6.6.2, respectively.

6.9.2 Connector Segment B

Connector Segment B is in Swede Grove Township in Meeker County within the Minnesota River Prairie ecological subsection (refer to Section 6.1 for a detailed description of this ecological subsection) and, as such, environmental features along the connector segment are similar to environmental features along the Purple and Blue Routes. Table 6.9.2-1 describes the environmental features located along Connector Segment B and the detailed maps in Appendix C show the environmental features along this connector segment.

Table 6.9.2-1 Environmental Features Crossed by Connector Segment B		
Environmental Features	**Unit**	**Connector Segment B**
Route Length	Miles	1.0
150-foot Right-of-Way	Acres	17.8
NLCD Land Cover/Use in 150-foot Right-of-Way		
Agricultural Land	Acres	8.2
Developed Areas	Acres	9.7
Wetlands	Acres	0.0
Forest Lands	Acres	0.0
Non-forested Uplands	Acres	0.0
Barren Land	Acres	0.0
Open Water	Acres	0.0
Following Existing Transmission Line	Miles	0.0
Following Road or Rail, but not Transmission Line	Miles	1.0
Following Property Line, but not Transmission Line, Road, or Rail	Miles	0.0
Not Following Existing Linear Feature	Miles	0.0
Total Residences	**Number**	**0**
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	0
Residences within 300-500 feet	Number	0
Prime Farmland Soils	Acres	17.8 / 100%
Surface Water Resources within the 150-foot Right-of-Way		
Streams/Rivers/Ditches	Count	1
Lakes or Ponds	Count	0
PWI Watercourses	Count	0
PWI Basins	Count	0
PWI Basins over 1,000 feet [2]	Count	0
PWI Wetlands	Count	0
PWI Wetlands over 1,000 feet [2]	Count	0
USACE Navigable Waters (Section 10)	Count	0
Trout Streams	Count	0
Trout Lakes	Count	0
Minnesota Designated ORVWs	Count	0
Shallow Lakes	Count	0
100-Year Floodplains	Acres/Percent	0.0 / 0%

Table 6.9.2-1 Environmental Features Crossed by Connector Segment B		
Environmental Features	**Unit**	**Connector Segment B**
500-Year Floodplains	Acres/Percent	0.0 / 0%
Wetlands within the 150-foot Right-of-Way		
Total Wetland Area	Acres	0
Palustrine Emergent (PEM) Wetland Community Area	Acres	0
Palustrine Scrub-Shrub (PSS) Wetland Community Area	Acres	0
Palustrine Forested (PFO) Wetland Community Area	Acres	0
Shallow Open Water / Non-vegetated Aquatic Community Area	Acres	0
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	0
NPCs in 150-foot Right-of-Way	Number	0

Connector Segment B predominantly crosses developed and agricultural land and approximately 100 percent of the acres in the 150-foot right-of-way of Connector Segment B are categorized as prime farmland. This connector segment is parallel to State Highway 4 for the entirety of its length, which would minimize impacts to farming operations. For example, where the transmission line follows the highway, monopoles would typically be constructed adjacent to the highway right-of-way with a typical spacing of 1,000 feet between structures, which would provide sufficient room for farming machinery to maneuver around transmission line structures. No residences are within 500 feet of this connector segment. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Sections 6.2 and 6.3.

The connector segment crosses one waterbody; no wetlands would be within the 150-foot right-of-way of this connector segment. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Section 6.5.4.

Construction of Connector Segment B would have similar impacts to flora and fauna as those discussed in Sections 6.5.6 and 6.5.7 for the proposed routes. The potential impacts of Connector Segment B on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the route options in Sections 6.6.1 and 6.6.2, respectively.

6.9.3 Connector Segment C

Connector Segment C is in Rheiderland Township in Chippewa County and Holland, Roseland, Lake Lillian, and East Lake Lillian Townships in Kandiyohi County within the Minnesota River Prairie ecological subsections (refer to Section 6.1 for a detailed description of this ecological subsection) and, as such, environmental features along the connector segment are similar to environmental features along the Purple and Blue Routes. Table 6.9.3-1 describes the environmental features located along Connector Segment C and the detailed maps in Appendix C show the environmental features along this connector segment.

Table 6.9.3-1 Environmental Features Crossed by Connector Segment C

Environmental Features	Unit	Connector Segment C
Route Length	Miles	28.7
150-foot Right-of-Way	Acres	521.1
NLCD Land Cover/Use in 150-foot Right-of-Way		
Agricultural Land	Acres	512.5
Developed Areas	Acres	8.4
Wetlands	Acres	0.2
Forest Lands	Acres	0.0
Non-forested Uplands	Acres	0.0
Barren Land	Acres	<0.1
Open Water	Acres	0.0
Following Existing Transmission Line	Miles	0.0
Following Road or Rail, but not Transmission Line	Miles	0.0
Following Property Line, but not Transmission Line, Road, or Rail	Miles	21.5
Not Following Existing Linear Feature	Miles	7.2
Total Residences	**Number**	**5**
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	2
Residences within 300-500 feet	Number	3
Prime Farmland Soils	Acres	513.7 / 99%
Surface Water Resources within the 150-foot Right-of-Way		
Streams/Rivers/Ditches	Count	29
Lakes or Ponds	Count	0
PWI Watercourses	Count	2

Table 6.9.3-1 Environmental Features Crossed by Connector Segment C		
Environmental Features	**Unit**	**Connector Segment C**
PWI Basins	Count	0
PWI Basins over 1,000 feet [2]	Count	0
PWI Wetlands	Count	0
PWI Wetlands over 1,000 feet [2]	Count	0
USACE Navigable Waters (Section 10)	Count	0
Trout Streams	Count	0
Trout Lakes	Count	0
Minnesota Designated ORVWs	Count	0
Shallow Lakes	Count	0
100-Year Floodplains	Acres/Percent	12.4 / 2%
500-Year Floodplains	Acres/Percent	0.0 / 0%
Wetlands within the 150-foot Right-of-Way		
Total Wetland Area	Acres	0.65
Palustrine Emergent (PEM) Wetland Community Area	Acres	0.44
Palustrine Scrub-Shrub (PSS) Wetland Community Area	Acres	0
Palustrine Forested (PFO) Wetland Community Area	Acres	0
Shallow Open Water / Non-vegetated Aquatic Community Area	Acres	0.21
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	0
NPCs in 150-foot Right-of-Way	Number	0

Connector Segment C predominantly crosses agricultural land and approximately 99 percent of the acres in the 150-foot right-of-way of Connector Segment C are categorized as prime farmland. This connector segment is parallel to parcel lines for about 75 percent of its length, which would minimize impacts to farming operations. Where the transmission line follows property and field lines, monopoles would typically be constructed on the property line with a typical spacing of 1,000 feet between structures, which would provide sufficient room for farming machinery to maneuver around transmission line structures.

Connector Segment C also crosses the southern municipal boundary of Prinsburg, is within 500 feet of five residences, and crosses 29 waterbodies (two are PWI watercourses). Most of these waterbodies are classified by the MNDNR as drainage ditches. Three unnamed streams are classified as streams, but are connected to the drainage ditch system. The two PWI watercourses flow regimes are classified as

perennial, while the other drainage ditches and streams flow regimes are classified as intermittent. About 0.7 acre of wetlands would be within the 150-foot right-of-way of this connector segment. The 1,000-foot route width of Connector Segment C also crosses the Dalton Johnson WMA, but the Application alignment and the 150-foot right-of-way of the connector segment are outside of the WMA boundary. This connector segment also crosses three BWSR easements. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Sections 6.2, 6.3, and 6.5.4.

Construction of Connector Segment C would have similar impacts to flora and fauna as those discussed in Sections 6.5.6 and 6.5.7 for the proposed routes. The potential impacts of Connector Segment C on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the route options in Sections 6.6.1 and 6.6.2, respectively.

6.9.4 Connector Segment D

Connector Segment D is in Clifton and Amiret Townships in Lyon County within the Minnesota River Prairie and Coteau Moraines ecological subsections (refer to Section 6.1 for a detailed description of these ecological subsections) and, as such, environmental features along the connector segment are similar to environmental features along the Purple and Blue Routes. Table 6.9.4-1 describes the environmental features located along Connector Segment D and the detailed maps in Appendix C show the environmental features along this connector segment.

Table 6.9.4-1 Environmental Features Crossed by Connector Segment D

Environmental Features	Unit	Connector Segment D
Route Length	Miles	8.1
150-foot Right-of-Way	Acres	145.9
NLCD Land Cover/Use in 150-foot Right-of-Way		
Agricultural Land	Acres	121.6
Developed Areas	Acres	19.0
Wetlands	Acres	5.2
Forest Lands	Acres	0.0
Non-forested Uplands	Acres	0.0
Barren Land	Acres	0.0
Open Water	Acres	0.0
Following Existing Transmission Line	Miles	0.0
Following Road or Rail, but not Transmission Line	Miles	3.0

Table 6.9.4-1 Environmental Features Crossed by Connector Segment D		
Environmental Features	**Unit**	**Connector Segment D**
Following Property Line, but not Transmission Line, Road, or Rail	Miles	3.5
Not Following Existing Linear Feature	Miles	1.5
Total Residences	**Number**	**2**
Residences within 0-75 feet	Number	0
Residences within 75-150 feet	Number	0
Residences within 150-300 feet	Number	2
Residences within 300-500 feet	Number	0
Prime Farmland Soils	Acres	131.3 / 90%
Surface Water Resources within the 150-foot Right-of-Way		
Streams/Rivers/Ditches	Count	11
Lakes or Ponds	Count	2
PWI Watercourses	Count	2
PWI Basins	Count	1
PWI Basins over 1,000 feet [2]	Count	0
PWI Wetlands	Count	0
PWI Wetlands over 1,000 feet [2]	Count	0
USACE Navigable Waters (Section 10)	Count	0
Trout Streams	Count	0
Trout Lakes	Count	0
Minnesota Designated ORVWs	Count	0
Shallow Lakes	Count	1
100-Year Floodplains	Acres/Percent	5.8 / 4%
500-Year Floodplains	Acres/Percent	0.4 / 0.3%
Wetlands within the 150-foot Right-of-Way		
Total Wetland Area	Acres	9.0
Palustrine Emergent (PEM) Wetland Community Area	Acres	8.2
Palustrine Scrub-Shrub (PSS) Wetland Community Area	Acres	0.5
Palustrine Forested (PFO) Wetland Community Area	Acres	0.0
Shallow Open Water / Non-vegetated Aquatic Community Area	Acres	0.3
SOBS ranked Moderate or Outstanding in 150-foot Right-of-Way	Number	2
NPCs in 150-foot Right-of-Way	Number	0

Connector Segment D predominantly crosses agricultural land and approximately 91 percent of the acres in the 150-foot right-of-way of Connector Segment D are categorized as prime farmland. This connector segment parallels road rights-of-way for 38 percent of its length and parcel lines for 44 percent of its length, which would minimize impacts to farming operations. Where the transmission line follows road rights-of-way and property lines, monopoles would typically be constructed adjacent to the highway right-of-way or on the property line with a typical spacing of 1,000 feet between structures, which would provide sufficient room for farming machinery to maneuver around transmission line structures. Two residences are within 300 feet of this connector segment.

Connector Segment D crosses 11 streams, rivers, or ditches (two are PWI watercourses), two lakes (one is a PWI basin), and one shallow lake. In addition, about 9.0 acres of wetlands would be within the 150-foot right-of-way of this connector segment. The 1,000-foot width of Connector Segment D crosses the eastern boundary of the Amiret WMA; however, the Application alignment and the 150-foot right-of-way would be outside the WMA boundary. This connector segment would also cross BWSR easements on either side of Meadow Creek. The Applicant would use the same construction and mitigation measures to construct the connector segment as are described for the Purple and Blue Routes in Sections 6.2, 6.3, and 6.5.4.

Construction of Connector Segment D would have similar impacts to flora and fauna as those discussed in Sections 6.5.6 and 6.5.7 for the proposed routes. The potential impacts of Connector Segment D on federal and state-listed threatened and endangered species and natural resource sites that may be present in the Project Study Area would be similar to those discussed for the route options in Sections 6.6.1 and 6.6.2, respectively.

Connector Segment D crosses two SOBS, both with a Biodiversity Significance Rank of Below. The Applicant would use the minimization and mitigation measures for SOBS as described for the Purple and Blue Routes in Sections 6.6.2.

7.0 FEDERAL AND STATE AGENCY, TRIBAL NATIONS, LOCAL GOVERNMENT, AND PUBLIC OUTREACH

This section describes outreach efforts conducted by the Applicant and discusses pre-application involvement by federal, state, and local agencies as well as the public information outreach campaign. Throughout the process, the Applicant provided opportunities for stakeholders and potentially affected landowners to participate in the routing process. This engagement provided the Applicant with valuable insight into landowner and public agency preferences regarding development of Project facilities, including the development of route options analyzed for the Project.

7.1 AGENCY OUTREACH

As part of pre-application efforts, in December 2022, the Applicant initiated outreach to public agencies and Tribal Nations through virtual meetings and Project notification correspondence. Many agencies, stakeholders, landowners, and interested parties were contacted to gather feedback on the Project. This included meetings with the Upper Sioux Community Pezihutazizi Oyate and Lower Sioux Indian Community THPOs, MNDNR, MNDOT, MNDOA, BWSR, and various cities and counties. Subsequently, the Applicant sent a Project introduction letter and map to Tribal Nations and other federal and state agencies with jurisdiction in the Project Study Area such as the USACE, USFWS, USDA NRCS, and the Minnesota SHPO (refer to Appendix E). The letter introduced the Project and requested input regarding resources that may be potentially affected. In the letter, the Applicant provided preliminary Project details and a potential timeline for major Project milestones, and requested input with respect to the resources under their jurisdiction, as well as the identification of federal and state permits and/or approvals that may be potentially required for the Project.

Copies of responses received as of October 23, 2023 are included in Appendix E. In addition, where the Applicant has had meetings or further engagement, those efforts are described in further detail below. The Applicant will continue coordination with applicable Tribal Nations, agencies, and government units as the Project proceeds.

7.1.1 U.S. Army Corps of Engineers

The USACE responded to the Project notification letter on September 26, 2023, and provided contact information for the USACE Project Manager that will evaluate the Applicant's Section 404 permit. The USACE Project Manager provided additional correspondence on October 12, 2023, that outlined the potential regulatory requirements for the Project and the process for obtaining a Section 10 and/or Section 404 permit from USACE.

7.1.2 Federal Aviation Administration

The FAA responded to the Project notification letter on September 22, 2023, and directed the Applicant to use the Notice Criteria Tool to determine whether Form 7460-1, Notice of Proposed Construction of Alternation is required for the Project.

7.1.3 Native American Tribal Nations

The Routing Study Area included the Upper Sioux Community Pezihutazizi Oyate and the Lower Sioux Indian Community. The Applicant met with the Upper Sioux Community Pezihutazizi Oyate THPO on March 2, 2023, and followed up by providing electronic routing files to both Upper Sioux Community Pezihutazizi Oyate and Lower Sioux Indian Community (refer to Appendix E). The Upper Sioux Community Pezihutazizi Oyate responded to the Project notification letter on October 10, 2023, and noted that they are interested in continuing to consult on the Project, as the Project areas are part of their ancestral homeland, pass near their current reservation boundary, and cross through some high-potential areas for culturally significant sites.

The Bois Forte Band of Chippewa responded to the Project notification letter on September 22, 2023, stating they will defer to the recommendations of the Upper Sioux Community Pezihutazizi Oyate and Lower Sioux Indian Community, whichever is the lead Tribal agency for the Project. The Bois Forte Band of Chippewa recommended that Tribal monitors are present during ground disturbing activities within a buffer of 250 yards of known historical sites and near the Minnesota River.

To date, the Applicant has received no further input from the Lower Sioux Indian Community and no additional responses to the Project notification letter. The Applicant remains committed to engaging with interested Tribes throughout this process.

7.1.4 State Agencies

7.1.4.1 Minnesota Department of Agriculture

The Applicant met with the MNDOA on December 20, 2022. The meeting provided Project background and proposed route options. MNDOA staff indicated that an Agriculture Mitigation Plan should be prepared for this type of transmission line project. The Applicant has prepared a Draft AIMP (Appendix H) and will continue to coordinate with the MNDOA to finalize this plan prior to construction of the Project.

7.1.4.2 Minnesota Department of Natural Resources

The Applicant met with MNDNR staff on December 19, 2022, and March 16 and May 24, 2023 to discuss impacts to resources, such as SOBS, NPCs, native prairie areas, and the crossings of the Mississippi, North Fork of the Crow, and Minnesota Rivers.

Discussion at the first meeting in December 2022 focused on the Commission process and MNDNR's participation in the permitting process. An overview of the Routing Study Area was examined with preliminary discussions of potential Minnesota and Mississippi River crossing locations. The March and May 2023 meetings provided updates to routing decisions and further discussions on Wild and Scenic River crossings. The MNDNR noted that the routing priority at the Wild and Scenic Rivers should be crossings where existing infrastructure occurs. The Applicant followed up with updated electronic files of the preliminary route options.

The MNDNR provided comments in a letter dated July 10, 2023, recommending further review of certain areas along the routes to reduce impacts to sensitive areas such as WMAs and trout streams; the Applicant refined several route options based on these recommendations. The Applicant will continue to work closely with the MNDNR to avoid and minimize impacts to resources under MNDNR's jurisdiction.

7.1.4.3 Minnesota Department of Transportation

The Applicant met with the MNDOT on December 19, 2022 and August 3, 2023. The meetings included a discussion of providing Project background and potential route options. Discussion focused on routes along Interstate 94 and state highways such as Minnesota Trunk Highways 15, 23, and 4. Anticipated timelines for permitting and construction were also discussed so the agency could review any conflicts with associated roadway projects.

The Applicant received a comment letter on August 30, 2023 from MNDOT in which it provided comments and recommendations from different divisions of the agency. The Applicant will continue to work with MNDOT to address its comments and concerns.

7.1.4.4 Minnesota Board of Water and Soil Resources

A meeting was held with the BWSR on August 20, 2023. The meeting included a discussion of providing Project background and potential routes. Discussion focused on routes that intersected with BWSR conservation easements. BWSR staff indicated additional evaluation would be required to assess compatibility of the Project with each easement. The Applicant will continue its coordination with BWSR regarding any easements proposed to the crossed by the Project.

7.1.5 Local Government Units

A summary of correspondence and meetings with LGUs as of October 23, 2023 is included in Table 7.1.5-1 below. The Applicant will continue to meet with city and county officials as the Project moves forward and the Applicant will obtain any necessary local permits. The meetings were focused on the initial introduction of the Project, the routing and regulatory process, and Project timelines. General topics discussed in these meetings included the importance of public and landowner engagement, planned development in municipal areas, and future road and highway projects.

Table 7.1.5-1 Minnesota Energy Connection Local Government Correspondence

Local Government Unit	Date of Meeting / Contact
COUNTIES	
Wright County	February 14, 2023; July 10, 2023
Nicollet County	February 24, 2023
Chippewa County	March 21, 2023
Lyon County	March 23, 2023; October 17, 2023[1]
Renville County	April 4, 2023, November 21, 2023
Stearns County	April 18, 2023; September 29, 2023
Meeker County	April 25, 2023, December 7, 2023
Redwood County	May 16, 2023; December 12, 2023
Kandiyohi County	September 19, 2023
Sherburne County	November 7, 2023
CITIES and TOWNSHIPS	
City of Cosmos, Meeker County	January 31, 2023
City of Dassel, Meeker County	February 1, 2023
City of Granite Falls, Yellow Medicine County	February 21, 2023
City of Marshall, Lyon County	February 22, 2023
McLeod County	March 8, 2023
City of Kimball Chamber of Commerce, Stearns County	April 27, 2023
City of Eden Valley, Meeker and Stearns County	August 16, 2023
City of St. Augusta, Stearns County	September 5, 2023
Harvey Township, Meeker County	September 11, 2023
City of Watkins, Meeker County	September 14, 2023
Edwards Township, Kandiyohi County	September 18, 2023
Manannah Township, Meeker County	October 17, 2023

[1] Dates of future scheduled meetings are included in this table.

7.2 PUBLIC OUTREACH

The Applicant sent out a public outreach mailing to approximately 150,000 landowners who own parcels within the Routing Study Area and other stakeholders and conducted virtual open house sessions in November 2022. Approximately 400 people attended the online meetings where Project representatives presented an overview of the Project plan and associated regulatory process.

The Applicant next conducted two rounds of public open houses, including online and in-person sessions. Open house invitations were sent to landowners with parcels in the Routing Study Area on February 1, 2023, and the first round of open houses was held in February and March 2023 where a total of approximately 550 people attended. The Applicant then refined route options, and open house invitations were sent again on May 24, 2023 to landowners within the area of the refined route options. The second round of open houses was held in June 2023 where a total of approximately 725 people attended. Table 7.2-1 summarizes the locations and dates of each public open house. The open house invitations provided information such as a general Project description, a map of the Routing Study Area and current route options, the Project's website address, and contact information to submit questions and comments.

Open house notices were also placed in the local newspapers. Refer to Appendix F for mailed letters and newspaper ads.

Landowner information for the mailing list was acquired directly from county tax record databases, and from an external data management company with which the Applicant holds a license. Refer to Section 3.2.5 and Appendix L for more detailed information.

Table 7.2-1 Minnesota Energy Connection Public Open House Summary

Open House Venue	Open House Location	Date of Open House
First Round		
Becker Community Center	Becker, MN	February 21, 2023
EverSpring Suites Event Center	Marshall, MN	February 27, 2023
Kilowatt Community Center	Granite Falls, MN	February 28, 2023
Willmar Conference Center (Best Western)	Willmar, MN	March 1, 2023
Redwood Area Community Center	Redwood Falls, MN	March 2, 2023
Virtual Open House, afternoon session	Online	March 6, 2023
Virtual Open House, evening session	Online	March 6, 2023
McLeod County Fairgrounds, Agribition Building	Hutchinson, MN	March 8, 2023

Table 7.2-1 Minnesota Energy Connection Public Open House Summary		
Open House Venue	**Open House Location**	**Date of Open House**
Second Round		
Powder Ridge Event Center	Kimball, MN	June 6, 2023
Becker Community Center	Becker, MN	June 7, 2023
Meeker County Fairgrounds 4H Building	Litchfield, MN	June 8, 2023
EverSpring Suites Event Center	Marshall, MN	June 12, 2023
Redwood Area Community Center	Redwood Falls, MN	June 13, 2023
Willmar Community Center	Willmar, MN	June 14, 2023
Kilowatt Community Center	Granite Falls, MN	June 15, 2023
Virtual Open House, afternoon session	Online	June 20, 2023
Virtual Open House, evening session	Online	June 20, 2023

Landowners and other stakeholders were encouraged to submit comments using comment forms available at each open house. A Project-specific website was also created, and its URL (www.MNEnergyConnection.com) was included on all correspondence for the public to reference. The website provided other means of submitting comments and obtaining information such as a Project-specific phone number, email address, fillable comment section, and an interactive map.

In many cases, local media covered the open houses. Newspaper articles and news stations provided information about the open houses.

The goal of each open house was to provide Project information and gather input from the public on several different transmission line routing options. The route options displayed were preliminary and Project staff communicated that none of the routes were preferred over another at that point in the process. The open houses had several stations to display and communicate important Project details to the attendees. Attendees could identify their property on large poster-sized route maps and Project staff provided a description of the route option, if requested. Several booths were also set up and staffed by the Applicant to give the attendees more detailed information and to answer any questions.

7.2.1 Summary of Common Themes

During the public open houses, formal and informal comments were collected and summarized. Common topics included the following:

- Proximity to residences;

- Agricultural impacts and avoidance/mitigation;
- Following section/property/field lines, roads, and highways;
- Impacts related to paralleling existing transmission lines (commenters expressed concern about a new transmission line paralleling an existing transmission line that was located on a field boundary or along a road right-of-way because the new line would create additional impacts to the agricultural land use.);
- Environmentally sensitive areas;
- Aesthetic impacts;
- Property values; and
- Safety.

Generally, the topics raised by members of the public regarding the Project are similar to those commonly raised regarding any transmission line Project, and many of these issues are avoided, minimized, or mitigated through prudent routing, implementation of construction BMPs, and restoration. These measures are described in further detail in Chapters 3.0 and 5.0.

8.0 REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

The Project will require multiple regulatory permits, reviews, and approvals. Table 8.0-1 provides a summary of the major permits, approvals, and consultations that may be required for the Project. The Applicant initiated agency consultations in December 2022 to introduce the Project, inform them about the Commission's CN and Route Permit processes, and to gather initial feedback and request their participation. Agency coordination and outreach will continue throughout the Project's permitting and construction. All permits, licenses, approvals, or consultations required for the Project will be obtained prior to construction beginning in the applicable areas.

Table 8.0-1 Summary of Potential Permits, Approvals, and Consultations

Administering Agency	Permit, Approval, or Consultation
Federal	
U.S. Army Corps of Engineers (USACE), St. Paul District	Section 404, Clean Water Act (CWA) – Discharge of Dredged and Fill Material
USACE, St. Paul District	Section 10 Rivers and Harbors Act
U.S. Fish and Wildlife Service (USFWS)	Section 7 Endangered Species Act Compliance[1]
Federal Aviation Administration (FAA)	Part 7460 review
Native American Tribes	Coordination upon request in support of USACE consultation[1]
State	
Minnesota Public Utilities Commission	Route Permit and Certificate of Need
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit
MPCA	Section 401 CWA Water Quality Certification
Minnesota Department of Natural Resources (MNDNR)	License to Cross Public Waters and Public Waters Work Permit
MNDNR	State Natural Heritage Information System (NHIS) Review
MNDNR	Water Use (Appropriation) Permit
Board of Water and Soil Resources	CREP/RIM Conservation Easement authorizations, Wetland Conservation Act
Minnesota State Historic Preservation Office (SHPO)	Minnesota Statutes Chapter 138 (Minnesota Field Archaeology Act and Minnesota Historic Sites Act)
Minnesota Department of Transportation (MNDOT)	Utility Permit on Trunk Highway
MNDOT	Driveway Access
MNDOT	Oversize/overweight permits

Table 8.0-1 Summary of Potential Permits, Approvals, and Consultations	
Administering Agency	**Permit, Approval, or Consultation**
Minnesota Department of Agriculture (MNDOA)	Agricultural Mitigation Plan
Local	
Soil and Water Conversation Districts	Coordination meetings
County, Township, City	Overwidth/Overweight Loads Permits
County, Township, City	Road Crossing Permits
County, Township, City	Driveway/Access Permits
[1] Consultation is performed by the USACE.	

8.1 FEDERAL APPROVALS

8.1.1 USACE, Section 404, Clean Water Act, Permit

A Section 404 permit is required from the USACE under the CWA for discharge of dredged or fill material into waters of the United States. The Applicant anticipates the Project will be eligible for coverage under the Utility Regional General Permit (RGP) and will submit a Pre-Construction Notification (PCN) to the USACE.

8.1.2 USACE, Section 10, Rivers and Harbors Act, Permit

The USACE regulates impacts to navigable waters of the United States under Section 10 of the River and Harbors Act. The Applicant would cross two Section 10 navigable waters regardless of the route selected: the Mississippi and Minnesota rivers. The Utility RGP includes coverage under Section 10, therefore the Applicant will include the necessary information in its PCN for crossing Section 10 waters.

8.1.3 USFWS, Endangered Species Act and Migratory Bird Treaty Act

The ESA of 1973, as amended, directs the USFWS to identify and protect endangered and threatened species and their critical habitat. Projects involving permit authorizations require consultation between the lead federal agency (i.e., the USACE) and the USFWS, pursuant to Section 7 of the ESA. As described above, the Project is anticipated to result in impacts that are eligible for coverage under the USACE Section 404 Utility RGP. Conditions of this permit require that the Applicant evaluate whether the activity might affect any federally listed threatened, endangered, or proposed threatened and endangered species, designated critical habitat, or proposed critical habitat in compliance with the ESA.

The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. The Applicant will work with USFWS to ensure compliance with the MBTA.

8.1.4 FAA, Part 7460 Review

FAA notice and approval are required for structures 200 feet above ground level or those that may exceed an imaginary surface extending outward and upward from public use airports at certain slopes defined in the CFR Chapter 77.9. Form 7460-1 shall be submitted to the FAA for notice of construction. Each individual structure meeting these requirements will be registered for notice, which would include information such as the latitude and longitude, structure height, and the elevation at the structure location. The FAA then conducts an aeronautical study for potential airspace impacts and issues a determination of hazard or no hazard. If a structure's location is changed prior to construction, it is necessary to resubmit Form 7460-1 for that structure. When the construction is complete, as-built information will be submitted using Form 7460-2.

8.2 MINNESOTA STATE APPROVALS

8.2.1 Route Permit and Certificate of Need

The Project requires a CN under Minnesota Statutes section 216B.2421, and a Route Permit under Minnesota Statute § 216E.03 and Minnesota Rules 7850.1700 to 7850.2700 and 7850.4000 to 7850.4400 from the MPUC.

8.2.2 MPCA, NPDES Permit

The MPCA requires an NPDES Construction Stormwater Permit for stormwater discharges associated with construction activities disturbing one acre of land or greater. Prior to construction, the Applicant will obtain a construction stormwater permit and develop and implement a SWPPP that identifies BMPs and construction measures to contain soils and to minimize discharge of sediment during stormwater events.

8.2.3 MPCA, Section 401, Clean Water Act

A Section 401 certification is necessary to obtain a federal permit for a project to ensure that the federal government does not issue a permit or license for a project that will result in a violation of the state water quality standards set under the CWA in WOTUS. The federal agency, in this case the USACE, cannot issue a permit until the MPCA has either certified that the project impacting WOTUS will comply with state water quality standards, or waived its review of the project. As discussed above, the Project is anticipated to result in impacts that are eligible for coverage under the USACE Section

404 Utility RGP. The MPCA has issued a Section 401 Certification associated with this RGP.

8.2.4 MNDNR, License to Cross Public Waters

A MNDNR Utility License is required for the passage of any utility over, under, or across any public land or public waters. The MNDNR Division of Lands and Minerals is responsible for granting approval in the form of a crossing license. In addition to a long-term license fee, there is a one-time crossing fee for each waterbody crossed. Agency review time of the application varies depending on the crossing technique and involves review and approval from several state departments and associated divisions.

8.2.5 MNDNR, Water Use (Appropriation) Permit

A water use (appropriation) permit from the MNDNR would be required for the Project if the Applicant plans to withdraw more than 10,000 gallons of water per day or 1 million gallons per year. The Applicant will identify the need for this permit after conducting geotechnical analysis.

8.2.6 Board of Water and Soil Resources, Wetland Conservation Act

The Minnesota BWSR administers the state Wetland Conservation Act. The Project will cause minimal permanent and temporary impacts to wetlands and is anticipated to be eligible for the Exemption for Utilities in accordance with Minn. Stat. § 103G.2241, subd. 6, and Minn. R. 8420.0420, Subp. 5, which allows the utility exemption for installation, maintenance, repair, or replacement of lines if (a) the impacts have been avoided and minimized to the extent possible; and (b) the proposed project significantly modifies or alters less than one-half acre of wetlands.

There are lands crossed by the proposed routes that are part of various conservation easement programs including RIM and CREP. The Applicant will work with the Minnesota BWSR and private landowners to coordinate the approvals necessary for placing the transmission facilities within these easements.

8.2.7 MNDNR, Threatened and Endangered Species Consultation

Pursuant to Minnesota's Endangered Species Statute, the MNDNR is required to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern and regulate treatment of these species. The Applicant will consult with the MNDNR regarding any Project-specific construction considerations related to Minnesota's Endangered Species law.

8.2.8 MNDOT, Utility Permit

The Applicant will apply for a Utility Accommodation on Trunk Highway Right of Way (Form 2525) for work along highways and other roadways as necessary. This permit is required for the construction of utility facilities crossing or paralleling existing trunk highway rights-of-way.

8.2.9 MNDOT, Driveway Access Permit

The Applicant will apply for an Access/Driveway Permit (Form 1721) for using driveways and access points to trunk highways crossed or paralleled by the Project during construction.

8.2.10 MNDOT, Oversize/Overweight Permits

The Applicant will apply for oversize and/or overweight permits for all vehicles using state trunk highways during construction and operation of the Project. These permits are required for vehicle loads of excess height, length, and/or weight, although overlength utility poles may be exempt. Certain overweight and/or overlength loads require escorts, which the Applicant will arrange as necessary.

8.2.11 MNDOA, Agriculture Mitigation Plan

The Applicant has developed an Agriculture Mitigation Plan for the Project. Applicant will consult with the MNDOA to develop a plan that details the measures to be implemented during construction of the Project to avoid, mitigate, or compensate for impacts on agricultural lands that may occur during construction. This plan will describe measures and BMPs used in agricultural land to minimize any negative impacts on cultivated fields and drain tile systems. Landowners would be compensated for any loss of or damage to crops, or for lands that cannot be planted because of Project construction activities.

8.3 MINNESOTA LOCAL APPROVALS

Once the Commission issues a Route Permit, local zoning, building and land use regulations and rules are preempted.[17] Typical other approvals associated with transmission line and associated facility construction are further detailed below.

[17] Minn. Stat. § 216E.10, subd. 1.

8.3.1 Road Crossing/Right-of-Way Permits

These permits may be required to occupy county, township, and city right-of-way and lands such as park lands, watershed districts, or other properties owned by these entities.

8.3.2 Over-width/Overweight Loads Permits

These permits may be required to move over-width or heavy loads on county, township, or city roads and will be obtained once a Route Permit has been issued by the Commission.

8.3.3 Driveway/Access Permits

These permits may be required to accommodate right-of-way access from county or local roadways and will be obtained once a Route Permit has been issued by the Commission.

9.0 SUMMARY

A summary of the route options presented in this Application is provided in Table 9.0-1.

Table 9.0-1 Summary of Route Options		
Factor	**Purple Route**	**Blue Route**
Route Specific	• Approximately 171 miles long	• Approximately 174 miles long
Routes Following Linear Features		
Following Existing Transmission Line (miles)	8.4	10.3
Following Road or Rail, but not Transmission Line (miles)	76.5	71.7
Following Property Line, but not Transmission Line, Pipeline, Road, or Rail (miles)	63.8	70.8
Following Existing Underground Pipeline (miles)	3.2	2.8
Not Following Existing Linear Feature (miles)	18.7	18.4
Human Settlement		
Public Services	No impacts to public services are anticipated	
Public Health and Safety	Effects on public health and safety for the route options would include only minor temporary increase in demand for services during construction from the presence of construction crews. The Applicant will comply with all applicable safety requirements during construction and operation of the proposed Project.	
Proximity to Residences (feet from Application alignment)		
0-75	0	0
76-150	8	8
151-300	68	61

Table 9.0-1 Summary of Route Options		
Factor	**Purple Route**	**Blue Route**
301-500	79	68
Noise	Temporary localized increases in noise during construction are anticipated but are not anticipated to vary based on route. Transmission line and substation noise levels will not exceed noise limits set by the MPCA.	
Aesthetics	The routes would introduce a new visual feature; however, a new transmission line would be consistent with existing viewshed in the Project Study Area given the presence of existing electric infrastructure, including transmission lines, and wind and solar generating facilities.	
Cultural Values	No impacts to cultural values are anticipated.	
Recreation	• Crosses two private Game Refuges • Crosses four State Water Trails (Mississippi, North Fork Crow, Minnesota, and Redwood Rivers) • Crosses of three state Wild and Scenic rivers (Mississippi, North Fork of Crow, and Minnesota) • Crosses seven snowmobile trails (most crossed multiple times) • Crosses two National Scenic Byways	• Crosses three private Game Refuges • Crosses four State Water Trails (Mississippi, North Fork Crow, Minnesota, and Redwood Rivers) • Crosses of three state Wild and Scenic rivers (Mississippi, North Fork of Crow, and Minnesota Rivers) • Crosses six snowmobile trails (most crossed multiple times) • Crosses two National Scenic Byways
Land-Based Economies		
Agriculture	• 2,393.2 acres / 77% of right-of-way crosses agricultural land	• 2,352.7 acres / 74% of right-of-way crosses agricultural land
Forestry	No impacts to commercial forestry operations will occur	
Tourism	No impacts to tourism are anticipated.	

Table 9.0-1 Summary of Route Options		
Factor	**Purple Route**	**Blue Route**
Mining	The entrance to mining operation ASIS ID 73164 would be crossed by the Application alignment. The Applicant would work with the owner of this mining operation to avoid interference with mining operations during construction.	No impacts to active mining operations are anticipated.
Archaeological and Historic Resources		
Previously Documented Archaeological Resources	• Six archaeological sites (3 in right-of-way). • None of the previously recorded sites have been evaluated for listing in the NRHP. • Additional research will be conducted to confirm the location of mortuary sites. Project design will be updated to ensure avoidance of these sites, as needed.	• 10 archaeological sites (four in right-of-way) • None of the previously recorded sites have been evaluated for listing in the NRHP. • Additional research will be conducted to confirm the location of mortuary sites. Project design will be updated to ensure avoidance of these sites, as needed.
Previously Documented Historic Resources	• 30 architectural sites (18 in right-of-way) • Nine historic cemeteries (two in right-of-way). Historic map research will be conducted prior to the start of Phase I survey to confirm the location of these sites. Project design will be updated to ensure avoidance of these sites, as needed.	• 16 architectural sites (11 in right-of-way) • None of the previously recorded sites have been evaluated for listing in the NRHP.
Natural Environment		
Air Quality and GHG	During construction, vehicle emissions and fugitive dust along right-of-way and local gravel roads are expected to occur. Construction-related emissions would be similar but much less than those resulting from normal agricultural activities. Any emissions of ozone from the transmission line or substations are expected to be well below federal and state standards	

Table 9.0-1 Summary of Route Options		
Factor	**Purple Route**	**Blue Route**
Surface Waters	• 125 waterbodies crossed by the right-of-way including 42 public waters • 135.1 acres of wetlands crossed by the right-of-way, including 17.5 acres of forested wetlands.	• 117 waterbodies crossed by the right-of-way including 39 public waters • 151.6 acres of wetlands crossed by the right-of-way, including 17.3 acres of forested wetlands.
Flora	Vegetation within the right-of-way would be cleared in accordance with NESC standards and to allow for construction access. Vegetation at structure locations would be permanently removed. Forested areas would be permanently converted to low-growing vegetation throughout the entire right-of-way where they occur. Impacts to woody vegetation have been minimized by routing to avoid areas where forested vegetation occurs to the extent practicable.	
Fauna	Woodland habitat would be cleared and converted to non-woody habitat. Construction activity and noise would temporarily displace wildlife from agricultural or grassland habitats. Following completion of construction and restoration, wildlife would generally move back into the area.	
Rare and Unique Natural Resources		
Rare and Unique Natural Resources	• Two federally listed threatened or endangered species within one mile • 12 state-listed threatened or endangered species within one mile • 18 SOBS, including 8 ranked as of Moderate Biodiversity Significance, and 10 ranked as Below • Three NPCs with ranks ranging from S1 to S3	• Three federally listed threatened or endangered species within one mile • Eight state-listed threatened or endangered species within one mile • 15 SOBS, including 6 ranked as of Moderate Biodiversity Significance, and 9 ranked as Below • Six NPCs with ranks ranging from S1 to S3

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