Appendices

Acronyms

AC	alternating current
ACSR	aluminum conductor steel reinforced
ACSS	aluminum conductor steel supported
AIMP	agricultural impact mitigation plan
ALJ	administrative law judge
AMA	Aquatic Management Area
Applicants	Minnesota Power and Great River Energy
AQI	Air Quality Index
AUAR	Alternative Urban Area-Wide Review
BEC	Boswell Energy Center
BGEPA	Bald and Golden Eagle Protection Act
BMP(s)	Best Management Practice(s)
BWSR	Board of Water and Soil Resources
CAA	Clean Air Act
CN	certificate of need
CO	carbon monoxide
CO_2	carbon dioxide
Commission	Minnesota Public Utilities Commission
CREAT	Climate Resilience Evaluation and Awareness Tool
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
dBA	decibel scale
DC	direct-current
SBS	Department of Natural Resources Sites of Biodiversity Significance
DNR	Department of Natural Resources
EA	environmental assessment
ECS	Ecological Classification System
EERA	Energy Environmental Review and Analysis
EJC	environmental justice concerns
EMI	electromagnetic interference
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
GBCA	Grassland Bird Conservation Areas
GHGs	Greenhouse gases
GIS	geographic information system
GPS	global position systems
GRE	Great River Energy
HVDC	High-voltage direct current
ICDs	implantable cardioverter defibrillators
IPaC	Information for Planning and Consultation
kV	kilovolt
kV/m	kV per meter
LGUs	local units of government

LRTP	Long-Range Transmission Plan
MDA	Minnesota Department of Agriculture
MEPA	Minnesota Environmental Policy Act
mG	milliGauss
MIAC	Minnesota Indian Affairs Council
MISO	Midcontinent Independent System Operator
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MWI	Minnesota Well Index
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHIS	Natural Heritage Inventory System
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NO_2	nitrogen dioxide
NOMN	northern Minnesota
NPDES	National Pollutant Discharge Elimination System
SDS	Sanitary Disposal System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O_3	ozone
OAH	Office of Administrative Hearings
OSA	Office of the State Archaeologist
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
PWI	public waters inventory
RCP	Representative Concentration Pathway
RICE	reciprocating internal combustion engine
ROI	Region of Influence
ROW	right-of-way
SBS	Sites of Biodiversity Significance
ScPDSI	Self-Calibrated Palmer Drought Severity Index
SDS	State Disposal System
SF_6	sulfur hexafluoride
SFIA	Sustainable Forest Incentive Act
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SSURGO	Soil Survey Geographic
SWPPP	Stormwater Pollution Prevention Plan
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TWh	Terawatt hours
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VOR	very high-frequency omni-directional range
WCA	Wetland Conservation Act
WMA(s)	Wildlife Management Area(s)

Summary

This environmental assessment (EA) has been prepared for the Northland Reliability Project (the project), a 345 kV double-circuit transmission line proposed by Minnesota Power and Great River Energy (GRE) (applicants). It evaluates the potential human and environmental impacts of the project and possible mitigation measures, including routing alternatives. Additionally, it evaluates alternatives to the project itself.

This EA is not a decision-making document but rather a guide for decision-makers. The EA is intended to facilitate informed decisions by state agencies, particularly with respect to the goals of the Minnesota Environmental Policy Act (MEPA) — "to create and maintain conditions under which human beings and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of the state's people" (Minn. Statute 116D.02).

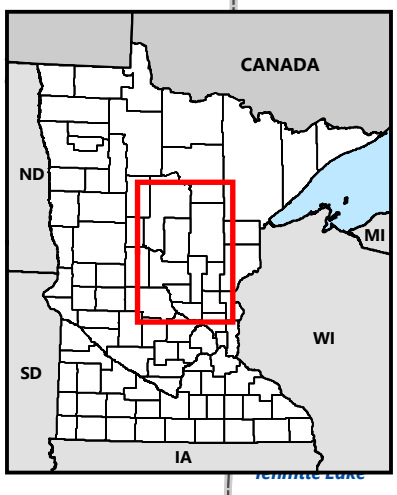
The Perceived Problem: Electrical Grid Reliability Concerns with the Shift to Renewable Energy

Over the past decades, the generation of electricity in Minnesota has evolved away from fossil-fueled baseload generating plants to renewable generating resources (e.g., wind and solar power). In 2011, over half of the electricity generated in Minnesota came from coal-fired electric power plants. In 2021, these plants produced only 27 percent of the electricity in Minnesota, while renewable generating resources provided 29 percent (reference (1)). This change in electrical generation has implications for the electrical transmission grid, among them, the grid may no longer connect generation resources in a manner that ensures reliable electrical service throughout the state.

Studies conducted by the applicants, along with the Midcontinent Independent System Operator (MISO), indicate that the electrical grid in north-central Minnesota will soon be unstable and unreliable if the transmission grid is not upgraded. Additionally, the grid in this area of the state will soon lose the voltage support provided by the Boswell Energy Center (BEC), a coal-fired generating plant in Cohasset, Minnesota. Unit 3 at the plant will cease operation by 2029; Unit 4 at the plant will cease operation by 2035. With these changes and without upgrades to the existing transmission grid, electrical service in north-central Minnesota would be unreliable; voltages at residences and businesses could be unstable.

A Possible Solution: The Northland Reliability Project

MISO and the applicants studied a number of possible solutions to this problem. After several years of study, MISO determined that a double-circuit 345 kV from the Iron Range substation near Grand Rapids, Minnesota, to the Sherco and Big Oaks substations in central Minnesota was the best solution. This solution – the Northland Reliability Project – most cost-effectively resolved the impending reliability issues in north-central Minnesota. MISO approved the project in the first phase (or "tranche") of its Long-Range Transmission Plan (LRTP) Tranche 1 Portfolio (reference (2)). MISO then assigned the development and construction of the Northland Reliability Project to the applicants. In August 2023, the applicants applied to the Minnesota Public Utilities Commission (Commission for a certificate of need (CN) and a route permit for the project (Map S-1).



Iron Range Substation

Cuyuna Series Compensation Station

Benton County Substation

Sherco Substation

Mud Lake
Grand Rapids
Pokegama Lake
Leech Lake
Itasca County
Saint Louis County
Boy Lake
Cass County
Woman Lake
St. Louis River
Sandy Lake Reservoir
Upper/Lower Whitefish
Mississippi River
Aitkin County
Wadena County
Crow Wing County
Pelican Lake
Carlton County
Rice Lake
Crow Wing River
Gull Lake
North Long Lake
Brainerd
Snake River
Mille Lacs Lake
Long Prairie River
Todd County
Little Falls
Morrison County
Mille Lacs County
Kanabec County
Pine County
Benton County
Isanti County
Chisago County
Sartell
Sauk Rapids
Waite Park
Saint Cloud
Cambridge
Sauk River
Stearns County
Sherburne County
Monticello
Elk River
Rum River
Anoka County
East Bethel
Meeker County
Crow River
St. Croix River

2 169 200 84 6 371 64 210 47 27 10 61 8

Applicants' Proposed Route
Route Alternative
Alignment Alternative
Existing Transmission Line
Benton County Substation
Iron Range Substation
Sherco Substation
Cuyuna Series Compensation Station

0 5 10 15
Miles

Map S-1

PROJECT OVERVIEW MAP
Northland Reliability Project

The State of Minnesota's Role

Though MISO is charged with operating the electrical transmission grid in the Upper Midwest, and though it may propose projects, it is ultimately the state of Minnesota that determines whether specific transmission lines are needed by the state and, if so, where they should be located. This authority is vested in the Commission. Thus, even though a project may be proposed and approved by MISO, it is the Commission that determines whether and where the project is built.

For the Northland Reliability Project, the Commission must make two decisions: (1) whether the proposed project is needed or whether some other project would be more appropriate for the state of Minnesota; for example, a project of a different type or size, and (2) if the proposed project is needed, where it should be located.

To help the Commission with its decision-making and to ensure a fair and thorough airing of the issues, the state of Minnesota has set out a process for the Commission to follow in making its decisions. This process requires (1) the development of an EA and (2) public hearings before an administrative law judge (Minn. Statutes 216B and 216E). The goal of the EA is to describe the potential human and environmental impacts of the project ("the facts"); the goal of the hearings is to advocate, question, and debate what the Commission should decide about the project ("what the facts mean"). The entire record developed in this process, including all public input and testimony, is considered by the Commission when it makes its decisions on the applicants' CN and route permit applications.

Commission Decision Criteria

The Commission makes its decisions on the applicants' CN and route permit applications through criteria set out in Minnesota statutes and rules. Per Minn. Rule 7849.0120, in order to grant a CN, the Commission must find that:

A. The probable result of denial would be an adverse effect on the future adequacy, reliability, or efficiency of energy supply to the applicant, to the applicant's customers, or to the people of Minnesota and neighboring states.

B. A more reasonable and prudent alternative to the proposed facility has not been demonstrated by a preponderance of the evidence on the record.

C. The proposed facility, or a suitable modification of the facility, will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health.

D. The record does not demonstrate that the design, construction, or operation of the proposed facility, or a suitable modification of the facility, will fail to comply with relevant policies, rules, and regulations of other state and federal agencies and local governments.

For a route permit, the Commission is charged with selecting transmission line routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity. Per Minn. Rule 7850.4100, the Commission must consider 14 factors when making a route permit decision:

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

B. Effects on public health and safety.

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

D. Effects on archaeological and historic resources.

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

F. Effects on rare and unique natural resources.

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

H. Use or paralleling of existing right-of-way (ROW), 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 ROWs.

K. Electrical systems 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.

Environmental Assessment

The Minnesota Environmental Policy Act requires that environmental review be conducted for major governmental actions with the potential to create significant environmental impacts (Minn. Statute 116D.04). To meet this requirement, the Commission has authorized the preparation of an EA. Department of Commerce (Department), Energy Environmental Review and Analysis (EERA) staff is responsible for preparing the EA on behalf of the Commission.

This EA is intended to facilitate informed decision-making by the Commission and other entities with regulatory authority over the project. It also assists citizens in providing guidance to decision-makers regarding the project. This EA analyzes the potential human and environmental impacts of the project and possible mitigation measures. It also analyzes alternatives to the project itself. The EA does not advocate or state a preference for a specific alternative. Instead, it analyzes and compares alternatives so that citizens, agencies, and governments can work from a common set of facts.

Public Participation

In their CN application, the applicants requested that the Commission approve a double-circuit 345 kV transmission line from the existing Iron Range Substation to a new Cuyuna Series Compensation Substation, to the existing Benton County Substation, finally connecting to the Sherco and Big Oaks Substations. In their route permit application, the applicants proposed a route for the project and discussed routing alternatives that were considered but not proposed by the applicants.

In preparing this EA, EERA staff solicited public comments on these applications. EERA staff solicited comments on (1) the human and environmental impacts that should be evaluated in the EA, (2) possible mitigation measures to study, including route alternatives, and (3) alternatives to the project itself that should be studied. This process of soliciting comments on the contents of the EA is known as “scoping.” EERA staff solicited comments through public meetings in October 2023 and through a comment period that ended on November 21, 2023. Based on the public comments received and after review by the Commission, the Department issued the scoping decision for this EA on March 22, 2024.

Public comments received during the scoping process increased the number of routing alternatives for the project. There is one route, 25 route alternatives, and 15 alignment alternatives that could be used for the project (Map S-1). The Commission could select and permit any of these alternatives or a combination of these alternatives.

Environmental Assessment Analysis and Routing Alternatives

The applicants are proposing to construct an approximately 180-mile-long double-circuit 345 kV transmission line between Grand Rapids, St. Cloud, and Becker, Minnesota. To facilitate analysis and discussion of the project, this EA divided the project into seven regions: the Iron Range Substation Region, the Hill City to Little Pine Region, the Cole Lake-Riverton Region, the Long Lake Region, the Morrison County Region, the Benton County Elk River Region, and the Sherburne County Region. The regions begin in the north, with the Iron Range Substation Region, and extend southward, ending with the Sherburn County Region. The regions were developed to facilitate analysis, as proposed route and alignment alternatives tended to be clustered in the same geographic areas along the route. A summary of the route and alignment alternatives located in each region is provided in Table S-1.

Table S-1 Summary of Route and Alignment Alternatives Analyzed in the EA

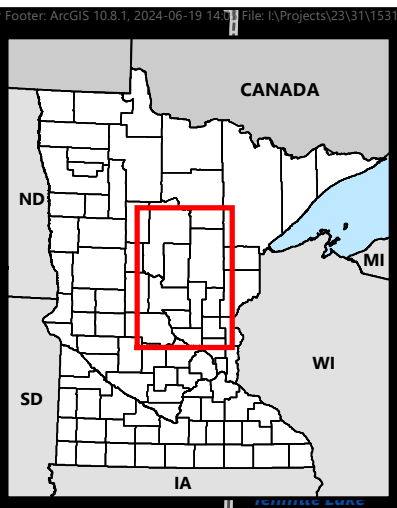
Region	Route Alternatives	Alignment Alternatives
Iron Range Substation	A1, A2, A3, A4	AA15
Hill City to Little Pine	B, C	AA1, AA2, AA16
Cole Lake-Riverton	D3, E1, E2, E3, E4, E5, F, G	AA3, AA4, AA6, AA7, AA8, AA9, AA10
Long Lake	H1, H2, H3, H4, H5, H6, H7, K	AA12, AA13, AA14, AA17
Morrison County	None	None
Benton County Elk River	J1, J2, J3	None
Sherburne County	None	None

Following the region-by-region analysis of each route and alignment alternative, four full route options (i.e., end-to-end routes from the Iron Range Substation to the Sherco and Big Oaks Substations) were identified and compared (Map S-2). These full route options are not meant to represent the only project routing possibilities. Rather, they are offered as examples of full-route options that could be assembled for the project, illustrating how various routing alternatives could be selected to build a full project route.

The full route options identified here were compiled by selecting routing alternatives or alignment alternatives within each region that could be feasibly connected to one another to create a full transmission line route between the existing Iron Range Substation, a new Cuyuna Series Compensation Substation, the existing Benton County Substation, the existing Sherco Substation, and the new Big Oaks Substation. Analyzing these four full route options against each other provides the opportunity to understand what impacts might look like if one of these full routes, or a similar route, were chosen for the project. The four full route options identified for analysis include:

- **The applicants' proposed route**. This is the route proposed by the applicants in their CN and route permit application.
- **The applicants' proposed route with modifications**. This route includes modifications proposed by the applicants in response to public comments and includes routing alternatives that would further consolidate the proposed new double-circuit 345 kV transmission line with existing transmission lines, particularly in the Cole Lake-Riverton Region. This route includes alignment alternatives AA3, AA9, and route alternative E1.
- **Example Route Option 1**. This route includes portions of the applicants' proposed route, including some modifications proposed by the applicants and routing alternatives proposed during the EA scoping comment period. This route includes route alternatives B, E1, H1 and alignment alternatives AA3 and AA16.
- **Example Route Option 2**. Similar to Route 1, this route includes portions of the applicants' proposed route, including some modifications proposed by the applicants and routing alternatives proposed during the EA scoping comment period. This route includes route alternatives A2, B, C, E1, H1, and J1 and alignment alternatives AA3 and AA16.

The summary of potential impacts that follow is limited to the four full route options that are identified above and analyzed in Chapter 7. Details of the potential human and environmental impacts of routing alternatives in specific regions of the project are discussed in Chapters 5 and 6.



Iron Range Substation
Cuyuna Series Compensation Station
Benton County Substation
Sherco Substation

Example Full Routes*
- Applicants' Proposed Route (A)
- Applicants' Proposed Route with Modifications (M)
- Example Route 1 (E1)
- Example Route 2 (E2)

- Benton County Substation
- Iron Range Substation
- Sherco Substation
- Cuyuna Series Compensation Station

* Routes follow Applicants' Proposed Route (A) except where noted.

0 5 10 15 Miles

Map S-2

EXAMPLE FULL ROUTES OVERVIEW MAP
Northland Reliability Project

Human and Environmental Impacts of the Project

Project construction and operation will impact human and environmental resources within the designated project area. Some impacts will be short-term and similar to those of any large construction project (e.g., noise, dust, soil disturbance). These impacts are fairly independent of the project route selected and can be mitigated by measures common to most construction projects.

Other impacts will exist for the life of the project and may include aesthetic impacts, impacts on land-based economies such as agriculture, forestry, and recreation and tourism as well as impacts to the natural environment and on rare and unique natural resources. These long-term impacts are generally not well mitigated by construction measures. That is, these impacts do not flow from how the project is constructed but rather through its design and location. Long-term impacts can be mitigated by prudent selection of the route and design for the project.

Many impacts are anticipated to be minimal—in and of themselves or with common mitigation measures—and fairly independent of the route selected for the project. These include:

- Impacts on human settlements (factor A)—noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services.
- Impacts on public health and safety (factor B)—electric magnetic fields (EMF), implantable medical devices, stray voltage, induced voltage, and air quality.
- Impacts on rare and unique natural resources (factor F) – federal- and state-protected species.
- Impacts on electric system reliability (factor K).

However, other impacts are anticipated to vary with the route and design of the project. These impacts include:

- Impacts on human settlements (factor A)—aesthetics, displacement, and communities with environmental justice concerns (EJC).
- Impacts on land-based economies (factor C)—agriculture, forestry, mining, and recreation and tourism.
- Impacts on archaeological and historic resources (factor D).
- Impacts on the natural environment (factor E) - water resources, vegetation (flora), and wildlife (fauna).
- Impacts on rare and unique natural resources (factor F) - sensitive ecological resources.
- Use or paralleling of existing rights-of-way (factors H and J).
- Costs that are dependent on design and route (factor L).

Potential human and environmental impacts of the four full route options are summarized in Table S-2 and discussed further here.

Table S-2 Human and Environmental Impacts for the Applicants' Proposed Routes and Example Full Route Options

Resource	Element	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Length (miles)		182.3	180.5	177.6	179.6
Human Settlement	Residences within 0-75 feet (count)	3	3	2	3
	Residences within 75-250 feet (count)	102	111	109	117
	Residences within 250-500 feet (count)	164	172	194	209
	Residences within 500-1,000 feet (count)	380	377	385	396
Environmental Justice Concerns (EJC)	communities with EJ concerns crossed by the 150-ft ROW (count)	6	5	7	7
Land-Based Economies	Agricultural land in 150-ft ROW (acres)	1,260	1,302	1,298	1,325
Archaeology and Historic Architecture	Archaeological sites and historic architectural resources in 1,000-foot route width (count)	42	43	41	37

Resource	Element	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Water Resources	NHD stream crossings (count)	151	150	150	134
	PWI stream crossings (count)	82	79	79	59
	Impaired stream crossings (count)	46	46	46	28
	NHD lake crossings (count)	20	15	18	21
	Impaired lake crossings (count)	0	1	1	1
	PWI basin crossings (count)	9	14	16	15
	PWI wetland crossings (count)	10	7	7	6
	Total wetlands in 150-foot ROW (acres)	986	957	968	926
	Forested wetlands in 150-ft ROW (acres)	235	223	233	218
	Wetland crossings greater than 1,000 feet (count)	67	64	65	62
Vegetation	Forested landcover in 150-foot ROW (acres)	590	551	472	476
Wildlife	Wildlife Management Areas in 150-foot ROW (acres)	14	18	5	5
	Grassland Bird Conservation Areas in 150-foot ROW (acres)	1,241	1,241	1,241	1,252
	Shallow Wildlife Lake in 150-foot ROW (acres)	6	6	6	6

Resource	Element	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Rare and Unique Natural Resources	Sites of Biodiversity in 150-foot ROW (ranked moderate, high, or outstanding; acres)	954	914	743	735
	Native plant communities in 150-foot ROW (acres)	293	275	276	271
	High Conservation Value Forest in 150-foot ROW (acres)	124	124	33	33
	Lake of Biological Significance in 150-foot ROW (acres)	2	5	5	5
	Federal- or state-protected species documented in 150-foot ROW (count)	3	3	3	3
ROW Sharing and Paralleling	Transmission line (miles, percent)	159.3 (87)	166.7 (92)	167.8 (95)	160.0 (89)
	Roadway (miles, percent)	4.0 (2)	4.0 (2)	3.9 (2)	13.3 (7)
	Field, parcel, or section lines (miles, percent)	55.0 (30)	48.1 (27)	44.4 (25)	52.7 (29)
	Total ROW sharing and paralleling (miles, percent)	176.4 (97)	177.0 (98)	174.2 (98)	175.0 (98)
Estimated Cost	Total estimated cost (2022 dollars in millions)	$963	$980	$1,013 to $1,053	$1,035 to $1,075

Human Settlements

Potential project impacts on human settlements are assessed through an evaluation of several elements, including noise, property values, electronic interference, cultural values, zoning and land-use compatibility, and public services. For some of the human settlement elements, project impacts are anticipated to be minimal and independent of the route selected. Analysis of impacts to human settlements focuses on those elements that vary with the route selected – aesthetics, displacement, and communities with EJC.

Aesthetics

Aesthetic impacts differ only slightly among the full route options; impacts can be minimized by placing the transmission line away from residences and by following existing infrastructure and ROW. Proximity of residences to the applicants' proposed routes and full route options are shown in Table S-3 and depicted graphically in Figure S-1, while ROW paralleling and sharing are shown in Table S-4 and depicted graphically in Figure S-2.

Each of the four full routes would have similar aesthetic impacts based on the project's proximity to residences. The applicants' proposed route is near the fewest number of residences; example route option 2 is near the greatest number of residences. Each of the full route options minimizes aesthetic impacts by paralleling and/or sharing existing ROW for between 97 and 98 percent of the route. However, considering the amount of each route that would follow existing transmission lines, example route option 1 likely best minimizes aesthetic impacts because 95 percent of this route follows existing transmission lines.

Table S-3 Proximity of Residences to Applicants' Proposed Routes and Example Full Route Options

Residences, Distance from Anticipated Alignment	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Residences within 0-75 feet	3	3	2	3
Residences within 75-250 feet	102	111	109	117
Residences within 250-500 feet	164	172	194	209
Residences within 500-1,000 feet	380	377	385	396
Total Residences within 1,000 feet	649	662	690	725

Figure S-1 Proximity of Residences to the Applicants' Proposed Routes and Example Full Route Options

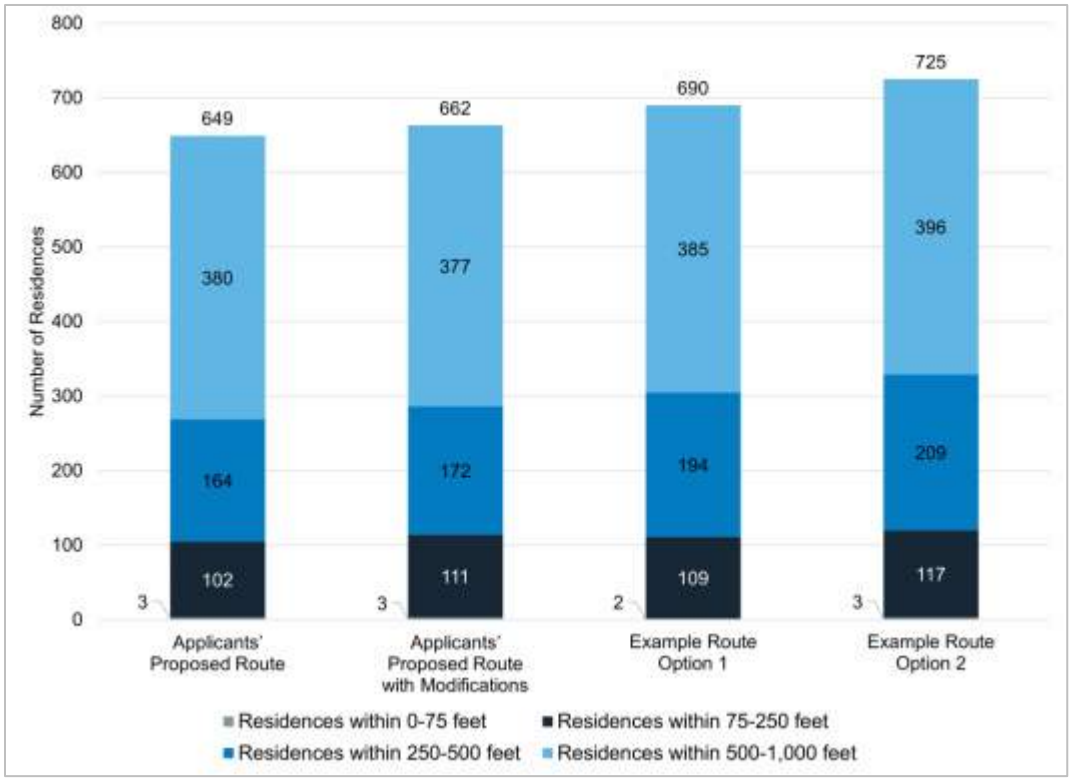
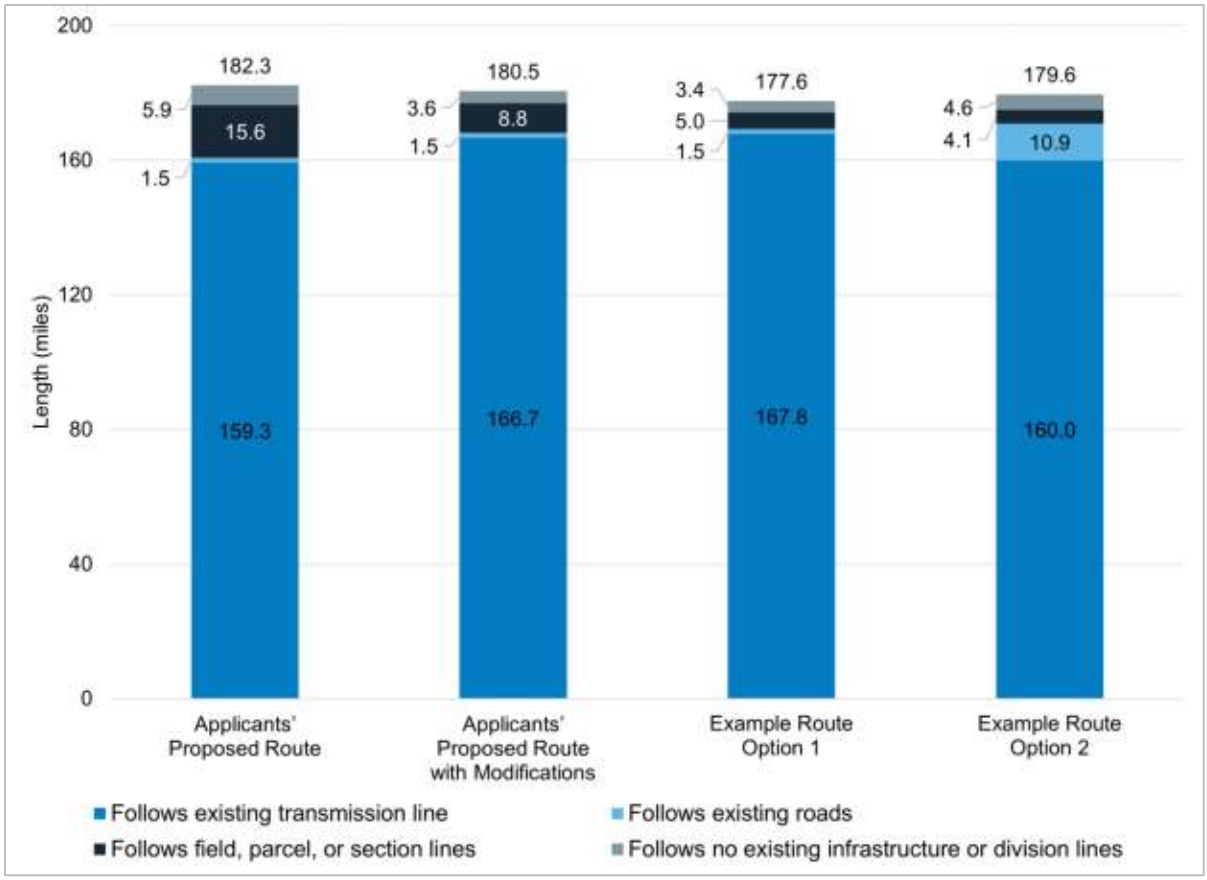


Table S-4 ROW Paralleling and Sharing of Applicants' Proposed Routes and Example Full Route Options

Infrastructure	Applicants' Proposed Route miles (percent)	Applicants' Proposed Route with Modifications miles (percent)	Example Route Option 1 miles (percent)	Example Route Option 2 miles (percent)
Follows Existing Railroad	1.0 (1)	1.0 (1)	1.0 (1)	1.0 (1)
Follows Existing Roads	4.0 (2)	4.0 (2)	3.9 (2)	13.3 (7)
Follows Existing Transmission Line	159.3 (87)	166.7 (92)	167.8 (95)	160.0 (89)
Total – Follows Transmission Line, Road, or Railroad	160.8 (88)	168.2 (93)	169.2 (95)	170.9 (95)
Follows Field, Parcel, or Section Lines	55.0 (30.2)	48.1 (26.6)	44.4 (25)	52.7 (29)
Total – ROW Paralleling and Sharing	176.4 (97)	177.0 (98)	174.2 (98)	175.0 (98)
Total Length of Route Alternative	182.3	180.5	177.6	179.6

Portions may share or parallel more than one type of infrastructure ROW or division/boundary line; therefore, the sum may be greater than 100 percent.

Figure S-2 ROW Sharing and Paralleling - Applicants' Proposed Routes and Example Full Route Options



Displacement

Residences or other buildings are typically not allowed within the transmission line ROW for electrical safety code and maintenance reasons. Any residences or other buildings located within a proposed ROW are, therefore, generally relocated or displaced.

The applicants' proposed route, proposed route with modifications, and example route option 2 may each result in the potential displacement of three residences, while example route option 1 may result in the potential displacement of two residences. In addition, each of these full routes could result in the potential displacement of several non-residential buildings (i.e., storage sheds, agricultural outbuildings, etc.) located within the 150-foot ROW (Table S-5).

Table S-5 Proximity of Residences and Non-Residences to Applicants' Proposed Routes and Example Full Route Options

Residences and Non-Residences, Distance from Anticipated Alignment	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Residences within 0-75 feet	3	3	2	3
Non-Residences within 0-75 feet	14	13	11	14
Total Residences and Non-Residences within 75 feet	17	16	13	17

Non-residential buildings within the 150-foot ROW may or may not be displaced as a result of the project. Though buildings are generally not allowed within the ROW of a transmission line, there are instances where the activities taking place in these buildings are compatible with the safe operation of the line (e.g., storage, animal production, etc.). For all residences and buildings in the ROW, the applicants would need to conduct a site-specific analysis to determine if the residence or building would be displaced.

Environmental Justice

Utility infrastructure can adversely impact low-income, minority, or tribal populations (communities with EJCs). Each of the full route options would cross several communities with EJCs (Table S-2). However, no adverse or permanent impacts to the identified communities with EJCs are anticipated. While each of the full routes included in this analysis intersect EJC communities, they are not anticipated to experience disproportionately adverse impacts as a result of the project, particularly because the transmission line will parallel and/or share existing ROW for the majority of these full route options (97 to 98 percent).

Land-Based Economies

Potential impacts to land-based economies are assessed through several elements. It addresses those elements of land-based economies that vary with the route selected – agricultural, forestry, mining, and recreation and tourism resources.

Agriculture

Impacts to agricultural land in the 150-foot ROW of the full route options would be relatively similar (Table S-2). The applicants' proposed route has the least amount of agricultural land within the ROW, totaling 1,260 acres (38 percent) (Table S-2). In contrast, example route option 2 has the most agricultural land within the ROW, with 1,325 acres (41 percent), representing a difference of approximately 65 acres (Table S-2).

Forestry

Impacts to designated forestry resources in the 150-foot ROW of the full route options would be relatively similar (Table S-2). Forestry land within the ROW of these options ranges between 472 acres (example route option 1) to 590 acres (applicants' proposed route).

There are designated forestry resources in the form of Minnesota Department of Natural Resources (DNR) state forest, Minnesota School Trust Land, and Forest for the Future land within the ROW of the full route options (Table S-6). The ROW of example route option 2 contains the fewest designated forestry resources (328 acres), while the applicants' proposed route with modifications contains the most (427 acres).

Table S-6 Designated Forestry Resources Within the 150-foot ROW of Applicants' Proposed Routes and Example Full Route Options

Forestry Acreage	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Acres of DNR state forest within 150-foot ROW	258	264	206	188
Acres of Minnesota School Trust Land[1] within 150-foot ROW	137	144	123	104
Acres of Forests for the Future[2] land within 150-foot ROW	19	19	32	36
Total Acreage	414	427	361	328

Data Sources: references (3); (4)
1 Minnesota School Trust Lands are DNR-administered lands that are set aside to provide a continual source of funding for public education (reference (4).
2 Minnesota's Forests for the Future Program is a conservation program administered by the DNR to encourage the protection of privately-owned forest lands through conservation easements or land purchases (reference (5)).

New transmission line construction through forested lands would be required for all full route options; however, example route option 1 minimizes forestry impacts most effectively by having the least amount of forested lands in its ROW. Example route option 1 also shares the most ROW with existing roadway and transmission line infrastructure (97 percent) (Table S-2). In areas of ROW paralleling and sharing, impacts to forestry resource lands have already occurred. Placement of transmission infrastructure in these locations may increase areas of forestry impact but would not introduce new impacts to an otherwise undisturbed forested setting.

Mining

Potential effects on mining operations are likely to occur if the construction or operation of a transmission line prevents access to and recovery of resources. The construction of a transmission line could limit the ability to mine these resources depending on the proximity of the resources to the project route selected.

There are no mining resources in the vicinity of the applicants' proposed route or the applicants' proposed route with modifications. Example route options 1 and 2 each have the same two aggregate mines located in their ROW, though both routes would follow an existing transmission line ROW through one of these aggregate mines, minimizing the introduction of new impacts.

Recreation and Tourism

Recreation and tourism opportunities in the project vicinity primarily consist of scenic byways, state forests, Wildlife Management Areas (WMAs), off-road vehicle trails, snowmobile trails, and water trails. Each full route option contains recreation and tourism opportunities. Compared to example route options 1 and 2, the applicants' proposed route and applicants' proposed route with modifications have the

following additional recreational resources in their rights-of-way: two scenic byways, two state forests, two WMAs, eight off-road vehicle trails, one snowmobile trail, and one water trail (Table S-7).

Table S-7 Recreational Resources Crossed by the 150-foot ROW of Applicants' Proposed Routes and Example Full Route Options

Route	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Scenic byways crossings (count)	4	4	2	2
State forest crossings (count)	6	6	4	4
WMA crossings (count)	2	2	0	0
Off-road vehicle trail crossings (count)	13	13	5	5
Snowmobile trail crossings (count)	8	8	7	7
Water trail crossings (count)	2	2	1	1

Example route options 1 and 2, as well as the applicants' proposed route with modifications, would each cross through a portion of the Cuyuna Country State Recreation Area. However, example route options 1 and 2 would cross this recreation area within existing transmission line ROW in an area of double-circuiting. An additional 80 feet of ROW from within the Cuyuna Country State Recreation Area would be needed to accommodate the double-circuiting and placement of the route through this area. As a result, only minor impacts to the Cuyuna Country State Recreation Area are anticipated. The applicants' proposed route with modifications would cross this recreation area parallel to existing road ROW at the far eastern edge of the recreation area and outside of the area used for recreation.

Since transmission line construction and operation generally has minimal permanent and temporary impacts to trails and introduction of new impacts would be minimized to the extent possible by ROW sharing and paralleling, recreation and tourism impacts as a result of the project are expected to be minimal. This said, example route options 1 and 2 are the most likely to minimize the project's impacts on recreation and tourism in the area.

Archaeological and Historic Resources

Between 37 and 43 archaeological and historic architectural resources are located within the 1,000-foot route width of the full route options (Table S-2). These resources are further classified in Table S-8. Most of these cultural resources have been previously determined to be ineligible for the National Register of Historic Places (NRHP) and therefore no additional work related to these cultural resources would be required for the project to proceed, regardless of which route is selected. However, the project has the potential to adversely affect those cultural resources that have not been evaluated for the NRHP, or which are listed on or have been determined eligible for listing on the NRHP (i.e., significant cultural resources).

Table S-8 Summary of Archaeological and Historic Architectural Resources within the 1,000-foot Route Width of Applicants' Proposed Route and Example Full Route Options

	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2
Count of NRHP-listed or -eligible Resources	5	5	6	6
Count of Unevaluated Cultural Resources	19	19	16	15
Count of Resources Previously Determined Not Eligible for NRHP	18	19	19	16

While the overall counts of cultural resource types are similar across all full route options, example route options 1 and 2 have less impact on archaeological and historic architectural resources. This is due to their use of existing infrastructure in proximity to significant cultural resources.

Of the significant cultural resources located within the route width of the applicants' proposed route and the applicants' proposed route with modifications, three NRHP-listed/-eligible historic architectural resources (XX-RRD-NPR007/ XX-RRD-NPR021, and CW-XXX-00001) have the potential for project impacts. Resource XX-RRD-NPR007/ XX-RRD-NPR021 consists of a duplicate recording of railroad ROW between the Lake Superior and Mississippi (LS&M)/ St. Paul and Duluth (StP & D) main line at Carlton and ND State Line at Moorhead, and resource CW-XXX-00001 consists of the Cuyuna Iron Range Historic Mining Landscape District. The applicants' proposed route would cross each of these resources in a brand-new location, which may alter these resource's setting, feeling, appearance, and/or association. Where example route options 1 and 2 cross these resources, the crossing occurs where an existing transmission line is present. Due to paralleling an existing transmission line, example route options 1 and 2 do not have the potential to introduce new impacts to the resources' setting, feeling, appearance, and/or association.

SH-BK-00012 (listed in the NRHP) and XX-RRD-00001 (eligible for the NRHP) would not be adversely affected by the project regardless of the route selected because these resources are located in an area that consists of double-circuiting on an existing transmission line. As a result, no new impacts to these cultural resources are anticipated because no new ROW would be acquired, nor would new visual or other impacts be introduced as a result of the project because the transmission line in proximity to these resources is existing.

Archaeological sites that are not evaluated or are listed in or eligible for the NRHP may also be impacted by the project if any of these sites are present within the footprint of ground disturbance. Ground disturbing activities have the potential to impact these resources if they cannot be avoided by the project. The primary means to minimize impacts to archaeological and historic architectural resources is prudent routing or structure placement – (i.e., avoiding known archaeological and historic resources). If they cannot be avoided, impacts to these resources could be mitigated by measures developed in consultation with State Historic Preservation Office (SHPO) prior to construction.

Natural Environment

Potential impacts to the natural environment are assessed by looking at several specific elements. For some of the elements of the natural environment, project impacts are anticipated to be minimal and

independent of the route selected and therefore are not discussed in the following sections. This section addresses those elements that do vary with the route selected – water resources, vegetation, and wildlife.

Water Resources

Impacts to floodplains and groundwater are anticipated to be minimal and independent of the route selected for the project. This discussion addresses watercourses and waterbodies, and wetlands.

Watercourses and Waterbodies

Each of the full route options would cross streams and waterbodies, as summarized in Table S-2. Example route option 2 minimizes stream crossings, including NHD streams, impaired streams, and public waters inventory (PWI) streams. However, the difference in stream crossings between example route option 2 and the other three full route options stems from the J1 route alternative in the Benton County Elk River region (which is part of example route option 2) being located in a new transmission line ROW west of the Elk River, while the other three full routes would use the applicants' equivalent to parallel an existing transmission line ROW while crossing the Elk River multiple times.

The applicants' equivalent in the Benton County Elk River region would cross the Elk River 26 times; this count is high due to the meandering nature of the Elk River. Waterbody crossings would be relatively comparable across each of the full route options. However, the applicants' proposed route with modifications would have fewer NHD lake crossings than the other three routes. The applicants' proposed route would have fewer PWI basin crossings but more PWI wetland crossings than the other three routes.

Wetlands

Wetlands within the rights-of-way of the full route options consist of emergent wetlands, forested wetlands, and shrub-dominated wetlands. The applicants' proposed route has the most acres of wetland (986 acres) and forested wetland (235 acres) within its 150-foot ROW, while example route option 2 has the least acres of wetland (926 acres) and forested wetland (218 acres) (Table S-2). Although wetlands would be spanned to the extent possible, each of the full route options would cross between 62 (example route option 2) and 67 (applicants' proposed route) wetland areas wider than 1,000 feet, which may require one or more structures to be placed in a wetland (Table S-2).

Vegetation

Each of the full route options would impact forested vegetation within their 150-foot ROW. Impacts to forested vegetation would be minimized with example route option 1 (472 acres) and example route option 2 (476 acres; Table S-2). The applicants' proposed route would impact 590 acres of forested vegetation in its ROW, while the applicants' proposed route with modifications would impact 551 acres of forested vegetation in its ROW (Table S-2). Each of the full route options would minimize impacts associated with forest fragmentation by following existing transmission line and/or road rights-of-way for the majority of their length (Table S-2).

Wildlife

Impacts to wildlife habitat would be relatively comparable for the full route options in that they would all cross WMAs, Grassland Bird Conservation Areas (GBCA), and a DNR-identified shallow wildlife lake. The

applicants' proposed route and the applicants' proposed route with modifications would cross the edge of the Birchdale and Moose Willow WMAs, while example route options 1 and 2 would only cross solely the edge of the Birchdale WMA. Example route option 2 would cross slightly more acres of GBCA than the other routes (Table S-2). Each of the full route options would minimize impacts associated with habitat fragmentation by following existing transmission line and/or road rights-of-way for the majority of their length (Table S-2).

Rare and Unique Natural Resources

Based on data reviewed from the Natural Heritage Inventory System (NHIS) database, there are no differences among the full route options with respect to documented federal- or state-protected species. Each of the full route options have one documented federally protected species (the northern long eared bat) and the same 15 state protected species documented within 1 mile of them. In addition, three of the 15 state protected species, including the loggerhead shrike, Blanding's turtle, and rock sandwort, have also been documented within the 150-foot ROW of each full route option. Potential impacts to these species can be mitigated by incorporating species-specific Best Management Practices (BMPs).

Each of the full route options would intersect several DNR Sites of Biodiversity Significance (SBS), with example route options 1 and 2 intersecting approximately 200 acres less than the applicants' proposed route and the applicants' proposed route with modifications (Table S-2). Each of the full route options would intersect native plant communities, with the applicants' proposed route intersecting slightly more than the other routes (Table S-2). Each of the full route options would also intersect High Conservation Value Forest, with example route options 1 and 2 intersecting approximately 90 fewer acres. All four full route options would intersect Lakes of Biological Significance while paralleling an existing transmission line ROW. The applicants' proposed route would traverse approximately 2 acres of one Lake of Biological Significance, while the other three routes would traverse approximately 5 acres of two Lakes of Biological Significance (Table S-2).

Relative Merits Summary

This discussion and presentation rely on text and a color graphic to describe the relative merits of the full route options (Table S-9). The color graphic and related notes for a specific routing factor or element are not meant to be indicative of the best route for the project but are provided as a relative comparison to be evaluated together with all other routing factors. For example, routes that are "red" for a particular factor or element are not meant to indicate a fatal flaw with a specific full route option. For routing factors where impacts are anticipated to vary with the full route options, the graphic represents the magnitude of anticipated difference between these anticipated impacts and compares them across the four full route options. For routing factors that express the state of Minnesota's interest in the efficient use of resources (e.g., the use and paralleling of existing rights-of-way), the graphic represents the consistency of the full route options with these interests and compares them to one another.

Table S-9 Guide to Relative Merits of the Applicants' Proposed Routes and Example Full Route Options

Anticipated Impacts or Consistency with Routing Factor	Symbol
Minimal: Impacts are anticipated to be minimal with mitigation – OR – route option is very consistent with this routing factor.	
Moderate: Impacts are anticipated to be minimal to moderate with mitigation; special permit conditions may be required for mitigation – OR – route alternative is very consistent with the routing factor, but less so than other route alternatives. Indicates that this route option may not be the least impactful with respect to this routing factor.	
Significant: Impacts are anticipated to be moderate to significant and likely unable to be mitigated – OR – route alternative is not consistent with the routing factor or consistent only in part. Indicates that this route option has notably more impacts with respect to this routing factor than other route options.	

Relative merits of the full route options for all routing factors / elements for which impacts are anticipated to vary among route options are shown and discussed in Table S-10.

Table S-10 Relative Merits of Applicants' Proposed Routes and Example Full Route Options

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Human Settlement – Aesthetics					Each of the four full routes would have similar aesthetic impacts based on proximity to residences. The applicants' proposed route is near the fewest number of residences; example route option 2 is near the greatest number of residences. Route option 1 uses the most existing transmission line ROW (95 percent), while the applicants' proposed route with modifications is second with 92 percent. Route option 2 and the applicants' proposed route each use less than 90 percent of existing transmission line ROW (89 percent and 87 percent, respectively).
Human Settlement – Displacement					Route option 1 has the fewest residences and non-residences within the 150-foot ROW (2 residences and 11 non-residences). The other three full route options each have 3 residences and between 13 and 14 non-residences within the 150-foot ROW. As such, route option 1 best minimizes displacement.
Human Settlement – Environmental Justice Concerns					The applicants' proposed route with modifications would only cross five EJ communities, where the other route options would cross six to seven EJ communities. However, since these full route examples mostly follow existing transmission line ROW, these EJ communities should not be adversely or disproportionately affected by the project and differences are marginal.
Land-Based Economies – Agriculture					There is only a difference of approximately 65 acres of agricultural land between each of the full route options. Impacts would be similar regardless of the route selected.
Land-Based Economies – Forestry					Route option 1 minimizes forestry impacts by having the least amount of forested lands in its ROW and by sharing the most ROW with existing roadway and transmission line infrastructure (97 percent).

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Land-Based Economies – Mining					Route options 1 and 2 have two aggregate mines within their rights-of-way; the applicants' proposed route and the applicants' proposed route with modifications do not. Impacts to the aggregate mines likely can be mitigated; thus, differences between the route options are marginal.
Land-Based Economies – Recreation and Tourism					The applicants' proposed route and applicants' proposed route with modifications have the following additional recreational resources in their rights-of-way compared to the route options 1 and 2: two scenic byways, two state forests, two Wildlife Management Areas (WMAs), eight off-road vehicle trails, one snowmobile trail, and one water trail. Example route options 1 and 2 would each require new ROW within the boundaries of the Cuyuna Country State Recreation Area.
Archaeological and Historic Architectural Resources					The applicants' proposed route and the applicants' proposed route with modifications would both cross significant cultural resources in an area of new ROW, where route options 1 and 2 would cross these same resources using existing transmission line ROW. Otherwise, counts of cultural resources are similar across each full route option.
Natural Environment – Watercourses and Waterbodies					Route option 2 would have the least number of stream crossings. However, it should be noted that the difference in stream crossings between route option 2 and the other three route options stems from the J1 route alternative in the Benton County Elk River region (which is part of example route option 2) being located in a new transmission line ROW west of the Elk River. In contrast, the other three full route options would use the applicants' equivalent to parallel an existing transmission line ROW while crossing a meandering section of the Elk River multiple times. The applicants' proposed route would avoid crossing an impaired lake and would have the least number of PWI basin crossings but would have the most PWI wetland crossings.
Natural Environment – Wetlands					The ROW of route option 2 has the least acres of wetland, including forested wetland.

Routing Factor/Resource	Applicants' Proposed Route	Applicants' Proposed Route with Modifications	Example Route Option 1	Example Route Option 2	Summary
Natural Environment – Vegetation					Route options 1 and 2 would have less impact on forested vegetation.
Natural Environment – Wildlife					Route option 1 minimizes impacts to wildlife and associated habitat by avoiding the Moose Lake WMA.
Rare and Unique Natural Resources					Route options 1 and 2 minimize impacts to Sites of Biodiversity Significance and High Conservation Value Forests.
Use or Paralleling of Existing ROW					Total ROW paralleling and sharing is nearly equal across all route options. There is some variation in the paralleling of existing transmission line rights-of-way. Route option 1 uses the most existing transmission line ROW (95 percent), while the applicants' proposed route with modifications is second with 92 percent. Route option 2 and the applicants' proposed route each use less than 90 percent of existing transmission line rights-of-way (89 percent and 87 percent, respectively).
Costs Dependent on Design and Route (2022 dollars in millions)	$963.7	$980.4	$1,013 to $1,053	$1,035 to $1,075	The applicants' proposed route is the least expensive, while example route option 2 is the most expensive. Factors affecting cost include double-circuiting long sections of transmission line in route options 1 and 2 as well as specialty structures that would be required near the Hill City/Quadna Mountain airport.

1 Introduction

This environmental assessment (EA) has been prepared for the Northland Reliability Project (the project), a 345 kilovolt (kV) double-circuit transmission line proposed by Minnesota Power and Great River Energy (GRE) (together, the applicants). This EA evaluates the potential human and environmental impacts of the project and possible mitigation measures, including route and alignment alternatives.

This EA is not a decision-making document, but rather a guide for decision-makers. The EA is intended to facilitate informed decisions by state agencies, particularly with respect to the goals of the Minnesota Environmental Policy Act "to create and maintain conditions under which human beings and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of the state's people" (Minn. Statute 116D.02).

1.1 Purpose and Need

The project is needed to address transmission system reliability concerns in northern and central Minnesota related to the region's transition away from coal-fired generation. During the transition from coal-fired to renewable generation, the project would increase transmission capabilities and access to renewable generation in the Upper Midwest. Reliability issues have been analyzed for a decade and include regional voltage and transient stability issues identified by the applicants and the Midcontinent Independent System Operator (MISO). The project addresses the region's reliability issues and would provide voltage support, improve system strength, and provide local sources of power delivery. The project also increases the ability to move power between regions, which helps ensure Minnesota has access to resources during extreme weather events.

The project was studied, reviewed, and approved as part of the Long-Range Transmission Plan (LRTP) Tranche 1 Portfolio by MISO's Board of Directors in July 2022 in its annual MISO Transmission Expansion Plan 2021 (MTEP21) report (reference (2)). The applicants considered several alternatives to the project, including: (1) new generation; (2) various transmission solutions, including upgrading other existing facilities, different conductors, different voltage levels and different endpoints; and (3) a no-build alternative. Alternatives to the project are discussed further in Chapter 4.

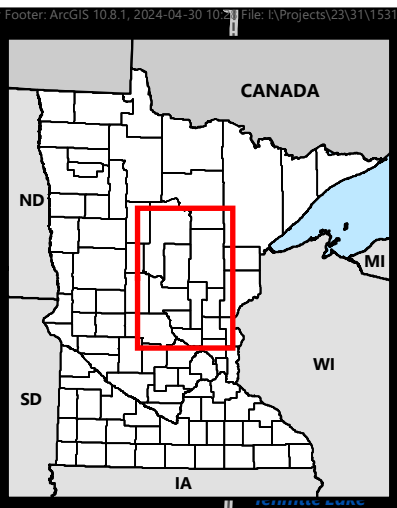
1.2 Project Description

The project includes the construction of approximately 180 miles of double-circuit 345 kV transmission line across Aitkin, Benton, Cass, Crow Wing, Itasca, Morrison, and Sherburne Counties (Map 1-1). The project consists of two major segments and makes use of existing high-voltage transmission lines and other right-of-way (ROW). The two major segments include:

- Segment 1: construct a new, approximately 140-mile-long, double-circuit 345 kV transmission line connecting Minnesota Power's existing Iron Range Substation, a new Cuyuna Series Compensation Station, and GRE's existing Benton County Substation. The proposed double-circuit 345 kV transmission line in Segment 1 would generally be located near and utilize existing high-voltage transmission line and other ROW where feasible.
- Segment 2: replace existing high-voltage transmission lines.
    - Replace GRE's existing, approximately 20-mile, 230 kV transmission line with a new, approximately 24-mile, double-circuit 345 kV transmission line from GRE's existing

Benton County Substation to the new Xcel Energy Big Oaks Substation, generally within existing ROW.

- Replace GRE's existing, approximately 20-mile, 345 kV transmission line with a new, approximately 18-mile, double-circuit 345 kV transmission line structures from GRE's existing Benton County Substation to Xcel Energy's existing Sherco Substation, generally within existing ROW. This transmission line will be constructed as a single-circuit 345 kV transmission line on double-circuit structures built to accommodate a second 345 kV circuit in the future.



Iron Range Substation

Iron Range Substation Region (IRSR)

Hill City to Little Pine Region (HCLPR)

Cole Lake/Riverton Region (CLRR)

Cuyuna Series Compensation Station

Long Lake Region (LLR)

Morrison County Region (MCR)

Benton County Elk River Region (BCERR)

Benton County Substation

Sherburne County Region (SCR)

Sherco Substation

Mud Lake
Grand Rapids
Pokegama Lake
Leech Lake
Boy Lake
Itasca County
Saint Louis County
Cass County
Woman Lake
St. Louis River
Sandy Lake Reservoir
Upper/Lower Whitefish
Mississippi River
Wadena County
Crow Wing County
Aitkin County
Pelican Lake
Carlton County
Crow Wing River
Gull Lake
North Long Lake
Rice Lake
Brainerd
Snake River
Mille Lacs Lake
Long Prairie River
Todd County
Little Falls
Morrison County
Mille Lacs County
Kanabec County
Pine County
Benton County
Isanti County
Chisago County
Sauk River
Sauk Rapids
Waite Park
Saint Cloud
Cambridge
Stearns County
Sherburne County
Wright County
Rum River
Anoka County
East Bethel
Monticello
Elk River
Meeker County
Crow River

Applicants' Proposed Route
Regions of Analysis
Existing Transmission Line
Benton County Substation
Iron Range Substation
Sherco Substation
Cuyuna Series Compensation Station

0 5 10 15
Miles

Map 1-1

PROJECT OVERVIEW MAP
Northland Reliability Project

The project will also involve the following improvements to the power grid:

- Expansion of the existing Iron Range Substation, near Grand Rapids, expansion of the existing Benton County Substation, near St. Cloud, and rerouting existing transmission lines at the Iron Range and Benton County substations.

- Construction of a new Cuyuna Series Compensation Station near the existing Riverton Substation and rerouting an existing transmission line in the Riverton area.

The applicants will co-own the new double-circuit 345 kV line between the Iron Range Substation, the Cuyuna Series Compensation Station, and the Benton County Substation. Minnesota Power will own the Iron Range Substation expansion and the Cuyuna Series Compensation Station. GRE will own the Benton County Substation expansion and the two transmission lines to be replaced between the Benton County Substation and the Big Oaks and Sherco substations.

The applicants' proposed route is located along existing high-voltage transmission lines for more than 85 percent of its length. By locating the project next to existing high-voltage transmission lines and other existing rights-of-way, the project can leverage existing rights-of-way rather than creating new ones. Locating the project along existing transmission line rights-of-way minimizes the potential impact of the project.

1.3 State of Minnesota's Role

Though MISO is charged with ensuring reliable, low-cost electrical energy throughout the mid-continent of North America, and though it may review and approve projects, it is ultimately the state of Minnesota that determines whether specific transmission lines are needed by the state and, if so, where they should be located. This authority is vested in the Minnesota Public Utilities Commission (Commission). Thus, even though a project may be approved by MISO, it is the Commission that determines whether a project is built, and where it will be constructed.

The project must obtain two approvals from the Commission – a certificate of need (CN) and a route permit. The project also requires approvals (e.g., permits, licenses) from other state agencies and federal agencies with permitting authority for specific resources (e.g., the waters of Minnesota). A route permit supersedes and preempts zoning restrictions, building, and land-use regulations promulgated by local units of government (Minn. Statute 216E.10).

The applicants applied to the Commission for a CN and route permit for the project on August 4, 2023. With this application, the Commission has before it two distinct considerations: (1) whether the proposed project is needed or whether some other project would be more appropriate for the state of Minnesota (e.g., a project of a different type or size, or a project that is not needed until further into the future), and (2) if the proposed project is needed, where it is best located.

The state of Minnesota has established an administrative procedural framework to guide and support Commission decision-making that upholds a fair and rigorous exploration of the issues at hand. This process requires: (1) the development of an EA and (2) public hearings before an administrative law judge. The goal of the EA is to describe the potential human and environmental impacts of the project ("the facts"); the goal of the hearings is to advocate, question, and debate what the Commission should decide about the project ("what the facts mean"). The entire record developed in this process—the EA and the report from the administrative law judge, including all public input and testimony—is considered by the Commission when it makes its decisions on the applicants' CN and route permit applications.

1.4 Organization of Environmental Assessment

This EA is based on the applicants' joint CN and route permit application, public comments received during the scoping comment period for this EA, and input from the Commission. The project has been separated into regions for analysis and discussion purposes (Map 1-1). These regions and the applicants' proposed route are described in more detail in Chapter 3.This EA addresses the matters identified in the project scoping decision (Appendix A) and is organized as follows:

	Summary	Provides a summary of the project – its potential impacts and possible mitigation measures
Chapter 1	Introduction	Provides an overview of the stated project need, the project itself, and the state of Minnesota's role, and discusses the organization of the document.
Chapter 2	Regulatory Framework	Describes the regulatory framework associated with the project, including the state of Minnesota's certificate of need and route permitting processes, the environmental review process, and the permits and approvals that would be required for the project.
Chapter 3	Overview of Project and Routing Alternatives	Describes the project and regions, including possible routes and alignment alternatives. Chapter 3 also describes the engineering, design, and construction of the project.
Chapter 4	Alternatives to the Proposed Project	Discusses the feasibility, availability, and potential impacts of system alternatives (i.e., alternatives other than a double-circuit 345 kV transmission line that may meet the stated need for the project).
Chapter 5	Affected Environment, Potential Impacts, and Mitigation Measures	Discusses the resources in the project area and the potential human and environmental impacts of the project and identifies measures that could be implemented to avoid or mitigate potential impacts. Chapter 5 discusses those impacts and mitigation measures that are common to all of the route and alignment alternatives studied in the EA. Also included is a discussion of the potential cumulative effects of the project.
Chapter 6	Impacts and Mitigation Measures by Region	Analyzes the potential human and environmental impacts of routing alternatives by region and possible mitigation measures.
Chapter 7	Relative Merits of the Project as a Whole	Discusses the merits of the applicants' proposed route, a modified version of the applicants' proposed route, and other example end-to-end routes, relative to the routing factors of Minnesota Rule 7850.4100.
	References	Provides references for resources used in development of the EA.

1.5 Sources of Information

The primary EA information sources are the joint CN and route permit application submitted by the applicants. Additional sources of information are indicated in Chapter 8. Data provided by the applicants and from state agencies during the preparation of the EA is also included.

A number of spatial data sources, which describe the resources in the project area, were used in preparing this EA (Appendix B). Spatial data from these sources can be imported into geographic information system (GIS) software, where the data can be analyzed and potential impacts of the project and routing alternatives quantified (e.g., acres of forested wetlands within the anticipated project ROW).

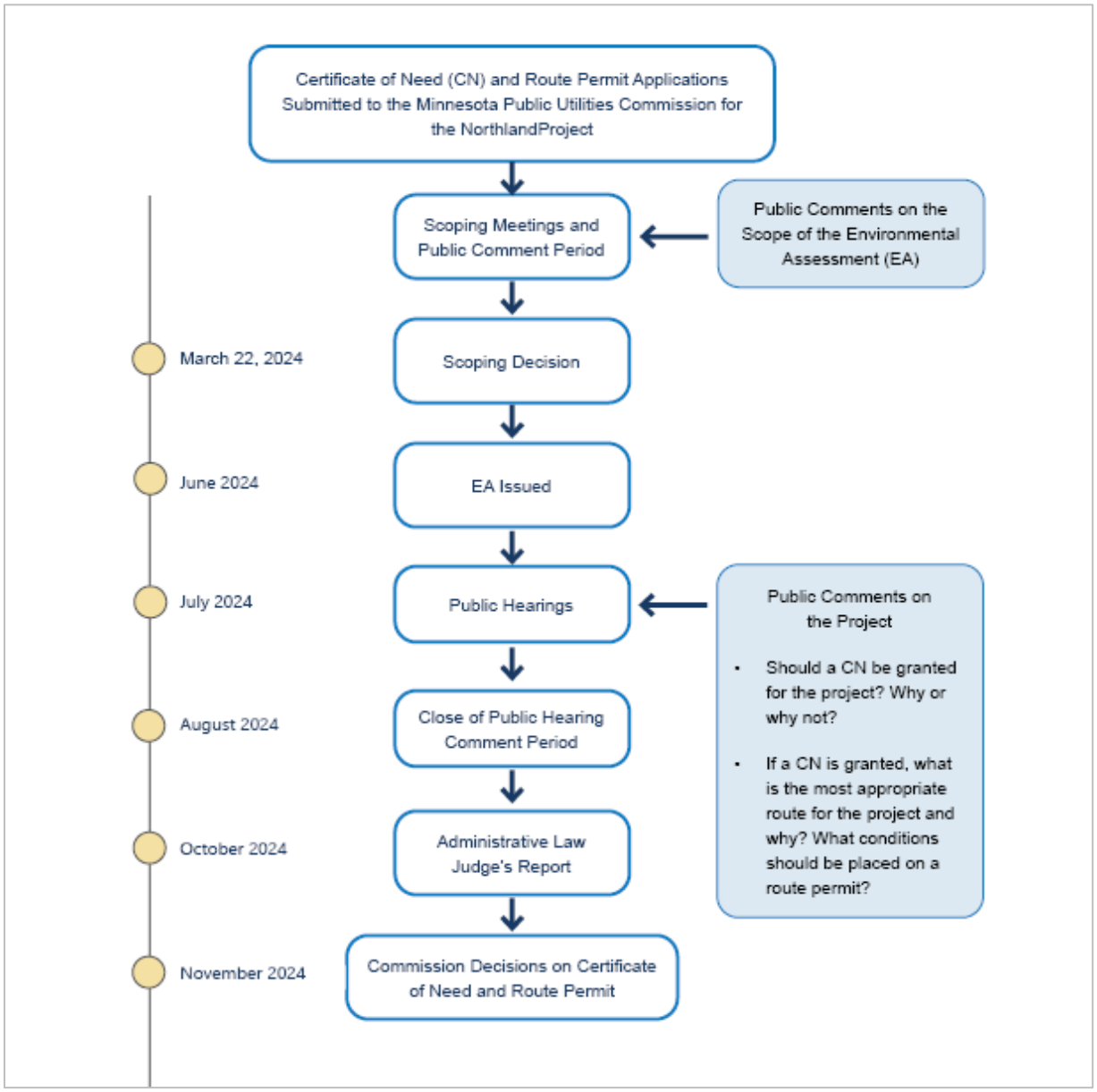
2 Regulatory Framework

The project requires two approvals from the Commission – a CN and a route permit. The Department of Commerce, Energy Environmental Review and Analysis (EERA) is responsible for environmental review of the project. The project will also require approvals from other state and federal agencies with permitting authority over related actions.

2.1 Certificate of Need

Construction of a large energy facility in Minnesota requires a CN from the Commission (Minn. Statute 216B.243). The project, a double-circuit 345 kV transmission line with a proposed length of over 100 miles, meets the definition of a large energy facility and requires a CN. On August 4, 2023, the applicants filed a joint CN and route permit application for the project. On November 15, 2023, the Commission accepted the application as complete and directed that the CN application be reviewed using the Commission's informal review process. The Commission referred the joint application to the Office of Administrative Hearings (OAH) and authorized joint public hearings and combined environmental review of the CN and route proceedings (Figure 2-1).

Figure 2-1 Commission's Environmental Review and Permitting Process for the Project



2.1.1 Certificate of Need Criteria

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

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

If the Commission determines that the applicant has met these criteria, a CN is granted. The CN decision does not determine the route the transmission line would take; the route is determined by the Commission's route permit.

The Commission's CN decision determines the type of project, the size of the project, and the project's termini (its start and end points). The Commission could place conditions on the granting of a CN; likewise, it has discretion to approve the project as proposed or with modifications. If the Commission denies the CN, this indicates that the Commission believes a more reasonable and prudent alternative is to not build the project (the "no-build alternative," see Chapter 4.1).

Within 12 months of the submission of a CN application, the Commission must approve or deny a CN for the project (Minn. Statute 216B.243). The Commission may extend this time if it has good cause and must issue an order explaining the good cause justification for an extension.

2.2 Route Permit

Construction of a high-voltage transmission line in Minnesota requires a route permit from the Commission (Minn. Statute 216E.03). The project, a double-circuit 345 kV transmission line, meets the definition of a high-voltage transmission line and requires a route permit from the Commission. As noted in Chapter 2.1, the applicants filed a joint CN and route permit application on August 4, 2023. The Commission accepted the application as complete on November 15, 2023. The Commission referred the application to the OAH and authorized joint public hearings and combined environmental review of the CN and route proceedings (Figure 2-1).

2.2.1 Route Permit Criteria

The Commission is charged with selecting transmission line routes that minimize adverse human and environmental impacts while ensuring electric power system reliability and integrity. Route permits issued

by the Commission include a permitted route and anticipated alignment, as well as conditions specifying construction and operation standards.

Minn. Statute 216E.03, identifies considerations that the Commission must take into account when designating transmission lines routes, including minimizing environmental impacts and minimizing human settlement and other land-use conflicts. Specifically, the Commission considers the following 14 factors when making a route permit decision (Minn. Rule 7850.4100):

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

The Commission must make specific findings that it has considered locating a route for a new transmission line along an existing transmission line ROW or parallel to existing highway ROW and, to the extent these are not used for the route, the Commission must state the reasons why (Minn. Statute 216E.03). The Commission may not issue a route permit for a project that requires a CN until a CN has been approved by the Commission, though these approvals may occur consecutively at the same Commission meeting (Minn. Statute 216B.243, and Minn. Rule 7849.1900).

The Commission is charged with making a final decision on a route permit within one year after finding the route permit application complete. The Commission may extend this time limit for up to three months for just cause or upon agreement of the applicants. Once a CN and route permit are issued by the

Commission, the applicants could exercise the power of eminent domain to acquire land for the project (see Chapter 3.4.1 for additional information regarding ROW acquisition and eminent domain).

2.3 Environmental Review

The Minnesota Environmental Policy Act (MEPA) requires an environmental review to be conducted for major governmental actions with the potential to create significant environmental impacts (Minn. Statute 116D.04). The Commission has determined that an EA will be prepared for the project. Department of Commerce (Department), EERA staff is responsible for preparing the EA on behalf of the Commission.

An EA is intended to facilitate informed decision-making by the Commission and other entities with regulatory authority over a project. It also assists citizens in providing guidance to decision-makers regarding the project. An EA describes and analyzes the potential human and environmental impacts of a project and possible mitigation measures, including alternatives to the project. The EA does not advocate or state a preference for a specific alternative. Instead, it analyzes and compares alternatives so that citizens, agencies, and governments can work from a common set of facts.

When there are two approvals before the Commission for a single transmission line project, the environmental reviews required for each approval may be combined. For this project, the Commission has authorized EERA to combine the environmental reviews required for the CN and route permit. Thus, EERA is developing a combined EA—an EA that addresses the potential human and environmental impacts of issuing a CN and route permit for the project.

The EA must be completed and made available prior to the public hearing for the project.

2.3.1 Scoping

The first step in preparing an EA is scoping. The purpose of scoping is to provide citizens, local governments, tribal governments, and agencies an opportunity to focus the EA on those issues and alternatives that are relevant to the proposed project.

EERA and Commission staff jointly held seven EA scoping and public information meetings in October 2023, to provide information about the permitting process and the project, answer questions, and gather input on topics to study in the EA. The meetings were held in Hill City, Ironton, Brainerd, Pierz, Clear Lake, and Sauk Rapids with an additional virtual meeting held for those who could not attend in person. Approximately 232 people attended these meetings and provided 62 comments (Appendix A).

A written comment period, held from October 5, 2023, to November 21, 2023, provided the public an opportunity to submit comments on potential impacts and mitigation measures for consideration in the scope of the EA. During the written comment period, 65 citizens, one tribal government, two state agencies, the applicants, and seven non-profits submitted comments. Public comments included impacts and mitigation measures suggested for study in the EA, including specific routing alternatives.

EERA staff provided a summary of the scoping process and recommendations to the Commission. The Commission concurred with EERA's recommendations regarding routing alternatives and required EERA to add an additional routing alternative that was provided after the close of the public comment period. The Department issued the scoping decision for the EA on March 22, 2024 (Appendix A). The scoping decision identifies the route and alignment alternatives that are evaluated in this EA and those alternatives that were not carried forward for evaluation. As a result of public scoping comments, 25 route alternatives and 15 alignment alternatives are included for study in this EA. EERA staff provided notice of

the scoping decision to those persons on the project mailing list and to all landowners along alternatives newly proposed during the scoping process.

2.4 Public Hearing

Upon completion of the EA, public hearings will be held in the project area. The hearings will be presided over by an administrative law judge (ALJ) from the OAH. In accordance with the Commission's order in this matter, the hearing on the CN will be held jointly with the hearing for the route permit. At the public hearing, citizens will have the opportunity to submit comments, present evidence, and ask questions. Citizens can advocate for or against the granting of a CN; they can also advocate for what they believe is the most appropriate route for the project and for any conditions to include in a route permit. Members of the public can also comment on the EA regarding any information that might be inaccurate or missing in the document.

After the public hearing, the ALJ will submit a report to the Commission with findings of facts, conclusions of law, and recommendations regarding a CN and a route permit for the project. EERA staff will respond to comments on the EA received during the hearing comment period, but staff is not required to revise or supplement the EA document. Upon completion of the environmental review and hearing process, the record will be presented to the Commission for final decisions.

2.5 Commission Decision

After considering the entire record, including the EA, input received during the public hearings, and the ALJ's findings and recommendations, the Commission will determine whether to grant a CN for the project as proposed, grant a CN contingent upon modifications to the project, or deny the CN. The Commission may also issue a conditional CN.

If a CN is granted, the Commission will also determine the final transmission line route. Route permits include a permitted route and an anticipated alignment, as well as conditions specifying construction and operating standards. Route permits also typically include mitigation plans and project-specific mitigation measures. Decisions by the Commission on the CN and route permit are anticipated in November 2024.

2.6 Other Permits and Approvals

A route permit from the Commission is the only state permit required for the project routing. A route permit supersedes local planning and zoning and binds state agencies (Minn. Statute 216E.10); therefore, state agencies are required to engage in the Commission's permitting process to aid in the Commission's decision-making and to indicate routes that are not permittable.

However, several federal, state, and local permits may be required for construction and operation of the project. All permits subsequent to the issuance of a route permit and necessary for the project must be obtained by the applicants. The information in this EA may be used by the subsequent permitting agencies as part of their environmental resource impact evaluation. Table 2-1, Table 2-2, and Table 2-3 list permits and approvals that could be required for the project, depending on the final design.

Table 2-1 Potential Federal Permits and Approvals Required for the Northland Reliability Project

Unit of Government	Type of Application	Purpose
U.S. Army Corps of Engineers – St. Paul District (USACE)	Section 404 Clean Water Act – Dredge and Fill	Protects water quality through authorized discharges of dredged and fill material into water of the United States
U.S. Army Corps of Engineers – St. Paul District (USACE)	Section 10 – Rivers and Harbor Act	Protects water quality through authorized crossings of navigable waters
U.S. Army Corps of Engineers – St. Paul District (USACE)	Section 106 of the National Historic Preservation Act	Requires federal agencies to avoid, minimize, and/or mitigate project-related effects to historic properties
U.S. Fish and Wildlife Service (USFWS)	Bald and Golden Eagle Protection Act Consultation	Review to prevent take of bald or golden eagles
U.S. Fish and Wildlife Service (USFWS)	Migratory Bird Treaty Act Consultation	Review to prevent take of protected migratory bird species
U.S. Fish and Wildlife Service (USFWS)	Section 7 Endangered Species Act Consultation	Establishes conservation measures for endangered species
Federal Aviation Administration (FAA)	Part 7460 Review	Review to Prevent airspace hazards due to structures taller than 200 feet
Native American Tribes	Coordination in support of Section 106 of the National Historic Preservation Act to determine impacts on traditional cultural properties and/or other resources of tribal significance	Coordination to prevent impacts to traditional cultural properties and/or other resources of tribal significance

Table 2-2 Potential State Permits and Approvals Required for the Northland Reliability Project

Unit of Government	Type of Application	Purpose
Minnesota Department of Natural Resources (DNR)	License to Cross Public Waters	License to prevent impacts associated with crossing public waters
Minnesota Department of Natural Resources (DNR)	License to Cross Public Lands	License to prevent impacts associated with crossing public lands
Minnesota Department of Natural Resources (DNR)	State Lease for Access Roads	Lease to cross state-managed lands on access roads
Minnesota Department of Natural Resources (DNR)	State Threatened and Endangered Species Consultation	Consultation to avoid, minimize, and mitigate impacts to state-listed species
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit	Minimizes impacts to waters due to construction of the project
Minnesota Pollution Control Agency (MPCA)	Section 401 Clean Water Act – Water Quality Certification	Ensures project will comply with state water quality standards
Minnesota Pollution Control Agency (MPCA)	Spill Prevention, Control and Countermeasure Plan	Ensures project will develop and implement a plan to prevent discharge of oil
Minnesota State Historic Preservation Office (SHPO)	National Historic Preservation Act Section 106 consultation; Minnesota Field Archaeology Act; Minnesota Historic Sites Act	Ensures adequate consideration of impacts on significant cultural resources
Minnesota Department of Agriculture (MDA)	Agricultural Impact Mitigation Plan	Establishes measures for protection of agricultural resources
Minnesota Department of Transportation (MNDOT)	Utility Permit	Authorizes accommodation of utilities along highway rights-of-way
Minnesota Department of Transportation (MNDOT)	Driveway Access	Authorizes access to driveways along highways
Minnesota Department of Transportation (MNDOT)	Oversize/Overweight Permit	Authorizes the use of roads for oversize or overweight vehicles
Minnesota Board of Water and Soil Resources (BWSR)	Wetland Conservation Act	Coordination with BWSR and local governments to ensure conservation of wetlands

Table 2-3 Potential Local and Other Permits and Approvals Required for the Northland Reliability Project

Unit of Government	Type of Application	Purpose
Local/County Governments	Road Crossing, Driveway, Oversize or Overweight, and Land Permits	Permits from local governments to ensure proper use of local roads and lands
City	Municipal Stormwater Permit	Ensures stormwater discharge is in compliance with local ordinances
Other utilities (pipelines, railroads, etc.)	Crossing Permits/Agreements/Approvals	Notifications to railroads and utilities

2.6.1 Federal Approvals

The United States Army Corps of Engineers (USACE) regulates potential impacts to waters of the United States. Dredged or fill material, including material that moves from construction sites into these waters, could impact water quality. The USACE requires permits for projects that may cause such impacts. The USACE is also charged with coordinating with the State Historic Preservation Office (SHPO) and Native American tribes regarding potential impacts to significant cultural resources pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The U.S. Fish and Wildlife Service (USFWS) requires permits for the taking of threatened or endangered species, bald and golden eagles, and native migratory birds. The USFWS encourages consultation with project proposers to ascertain a project's potential to impact these species and to identify general mitigation measures for the project.

The Federal Aviation Administration (FAA) regulates civil aviation, including the airspace used for aviation. The FAA requires permits for tall structures that could adversely impact aviation.

2.6.2 State of Minnesota Approvals

The Minnesota Department of Natural Resources (DNR) regulates potential impacts to Minnesota's public lands and waters. The DNR requires a license to cross public lands and waters; licenses may require mitigation measures. Similar to the USFWS, the DNR also encourages consultation with project proposers to ascertain a project's potential to impact state-listed threatened and endangered species and possible mitigation measures.

A general National Pollutant Discharge Elimination System (NPDES) / Sanitary Disposal System (SDS) construction stormwater permit from the Minnesota Pollution Control Agency (MPCA) is required for stormwater discharges from construction sites. A permit is required if a project disturbs 1 acre or more of land. The general NPDES/SDS permit requires (1) use of best management practices (BMPs), (2) a stormwater pollution prevention plan, and (3) adequate stormwater treatment capacity once the project is constructed. The NPDES/SDS permit ensures that state water quality standards are not compromised. If new transformers are added to the Iron Range Substation or Benton County Substation that result in changes to oil storage, a Spill Prevention, Control and Countermeasure (SPCC) plan update would be needed.

The Minnesota State Historic Preservation Office (SHPO) is charged with preserving and protecting the state's cultural resources. SHPO consults with project proposers and state agencies to identify cultural resources (e.g., through surveys) and to avoid and minimize impacts to these resources.

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

A permit from the Minnesota Department of Transportation (MnDOT) is required for transmission lines that are adjacent to or cross over Minnesota trunk highway ROW. MnDOT's utility accommodation policy generally allows utilities to occupy portions of highway ROW where such occupation does not put the safety of the traveling public or highway workers at risk or unduly impair the public's investment in the transportation system.

The Minnesota Board of Water and Soil Resources (BWSR) oversees implementation of Minnesota's Wetland Conservation Act (WCA). The WCA is implemented by local units of government (LGUs). For linear projects that cross multiple LGUs, BWSR typically coordinates the review of potential wetland impacts among the affected LGUs. The WCA requires anyone proposing to impact a wetland to (1) try to avoid the impact, (2) try to minimize any unavoidable impacts, and (3) replace any lost wetland functions.

2.6.3 Local Approvals

The Commission's route permit supersedes local planning and zoning regulations and ordinances. However, the applicants must obtain all local approvals necessary for the project that are not preempted by the Commission's route permit, such as approvals for the safe use of local roads.

2.6.4 Other Approvals

Other approvals and/or crossing agreements may be required where project facilities cross an existing utility, such as a pipeline, solar facility, or railway. The need for such approvals will be determined after the final route is selected, and the applicants have indicated that these approvals would be obtained after a route permit has been issued by the Commission.

2.6.5 Conservation Programs

There are lands throughout the project area that are part of various conservation programs, including but not limited to Reinvest in Minnesota (RIM), Conservation Reserve Enhancement Program (CREP), the Sustainable Forest Incentive Act (SFIA), and Forest for the Future. The applicants indicate that they will work with landowners, local governmental entities administering such programs, and sponsoring federal agencies on a site-specific basis to coordinate the approvals necessary for placing the project on these lands.

2.6.6 Electric Safety and Reliability Costs

The project must meet the requirements of the National Electrical Safety Code (NESC). Utilities must comply with the most recent edition of the NESC, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or upgrading existing facilities (Minn. Statute 326B.35).

The NESC is designed to protect human health and the environment. It also ensures that the transmission lines and all associated structures are built from high-quality materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided that routine maintenance is performed.

Utilities must also comply with North American Electric Reliability Corporation (NERC) standards. NERC standards define the reliability requirements for planning and operating the electrical transmission grid in North America.

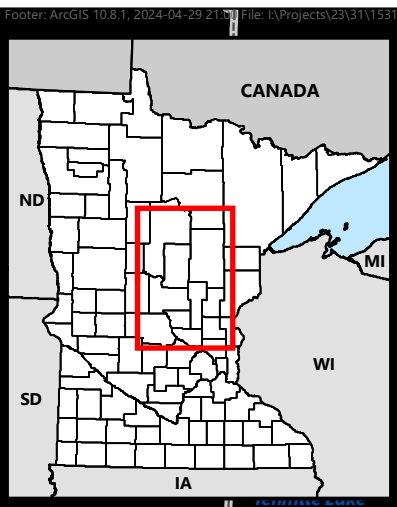
3 Overview of Project and Routing Alternatives

The applicants are proposing to construct an approximately 180-mile-long double-circuit 345 kV transmission line between Grand Rapids, St. Cloud, and Becker, Minnesota. To facilitate analysis and discussion of the project, this EA divides the project into eight regions (Map 3-1). The regions begin in the north, with the Iron Range Substation Region, and extend southward, ending with the Sherburn County Region.

In addition to the applicants' proposed route, there are 25 route alternatives and 15 alignment alternatives that could be used for the project (Map 3-1). Any of these alternatives, or a combination of these alternatives, could be selected and permitted by the Commission. Each of the routing alternatives is described in Chapter 3 and Appendix A, with accompanying maps in Appendix C.

This chapter describes the transmission line structures that could be used for the project and the project's associated facilities. Additionally, this chapter discusses how the project would be constructed and its anticipated costs and schedule. Several terms used throughout this Chapter and the remaining document have specific meaning and are defined here for clarity.

- **ROW** means the land interest required within a route for the construction, maintenance, and operation of a high-voltage transmission line (Minn. Rule 7850.1000).
- **ROW sharing** means that the new transmission line would be co-located with an existing transmission line or other existing infrastructure ROW (e.g., transportation corridors, pipelines, etc.) to partially share that existing ROW and lessen the overall easement width required from landowners.
- **ROW paralleling** refers to siting a transmission line such that it would run adjacent to existing rights-of-way (e.g., transportation corridors, pipelines, and other electrical transmission lines), thereby lessening impacts to the landscape and environment. ROW paralleling does not lessen the overall ROW width required from landowners for the new transmission line.
- **Double-circuiting** refers to a transmission line design whereby transmission structures are designed to carry two alternating current (AC) lines, as opposed to a single circuit (i.e., one line). Double-circuiting is advantageous because two transmission lines use the same ROW and same structures in a double-circuit design.



Iron Range Substation

Iron Range Substation Region (IRSR)

Hill City to Little Pine Region (HCLPR)

Cole Lake/Riverton Region (CLRR)

Cuyuna Series Compensation Station

Long Lake Region (LLR)

Morrison County Region (MCR)

Benton County Elk River Region (BCERR)

Benton County Substation

Sherburne County Region (SCR)

Sherco Substation

Mud Lake
Grand Rapids
Pokegama Lake
Leech Lake
Boy Lake
Itasca County
Saint Louis County
Cass County
Woman Lake
St. Louis River
Sandy Lake Reservoir
Upper/Lower Whitefish
Mississippi River
Aitkin County
Wadena County
Crow Wing County
Pelican Lake
Carlton County
Crow Wing River
Gull Lake
North Long Lake
Rice Lake
Brainerd
Snake River
Mille Lacs Lake
Long Prairie River
Todd County
Mille Lacs County
Little Falls
Morrison County
Kanabec County
Pine County
Benton County
Isanti County
Chisago County
Sauk River
Sauk Rapids
Waite Park
Saint Cloud
Cambridge
Stearns County
Sherburne County
Wright County
Rum River
Anoka County
East Bethel
Monticello
Elk River
Meeker County
Crow River

Applicants' Proposed Route
Route Alternative
Alignment Alternative
Regions of Analysis
Existing Transmission Line

Benton County Substation
Iron Range Substation
Sherco Substation
Cuyuna Series Compensation Station

0 5 10 15
Miles

Map 3-1

ROUTING ALTERNATIVES OVERVIEW MAP
Northland Reliability Project

3.1 Route and Alignment Alternatives

Route and alignment alternatives are presented here by region from north to south. Each region includes a portion of the applicants' proposed route. A detailed overview of each routing alternative is also provided in Map Book 3A.

3.1.1 Iron Range Substation Region

The Iron Range Substation region, located in Trout Lake and Blackberry Townships, Itasca County, is the northernmost region of the project. This region includes the Iron Range Substation area, which is the northern endpoint of the project. In addition to the applicants' proposed route, the region has four route alternatives (A1, A2, A3 and A4) and one alignment alternative (AA15) (Map 3-2).

3.1.1.1 Applicants' Proposed Route – Iron Range Substation Region

The applicants' proposed route begins at Minnesota Power's existing Iron Range Substation and continues south for approximately 1 mile before turning due west for 0.75 mile where it crosses County Road 10. It then turns south for 0.5 mile and turns west again for 0.75 mile. The transmission line then travels southwest for approximately 3.1 miles where it meets US Highway 2 at the southern end of the Iron Range Substation region.

3.1.1.2 Route Alternative A1

The A1 route alternative is 3.4 miles long and generally follows the applicants' proposed route but shifts west away from state property and onto the applicants' property at the northern end near the Iron Range Substation. Route alternative A1 then turns south and crosses County Road 10 southeast of the applicants' proposed route, ultimately crossing the Swan River at a previously disturbed bridge location. Route alternative A1 does not include any transmission line ROW sharing, paralleling, or double-circuiting.

3.1.1.3 Route Alternative A2

The A2 route alternative is 3.4 miles long and generally follows the applicants' proposed route but shifts west away from state property and onto the applicants' property at the northern end near the Iron Range Substation. Route alternative A2 veers southward, intersecting County Road 10 southeast of the applicants' proposed route. The route then follows County Road 445 until it reaches a junction with a lengthy driveway bordering an agricultural field. At this point, it shifts westward, crossing the Swan River at a previously disturbed bridge site. Route alternative A2 does not include any transmission line ROW sharing, paralleling, or double-circuiting.

3.1.1.4 Route Alternative A3

Route alternative A3 is 1.4 miles long and diverges from the applicants' proposed route just west of County Road 10. From that point, route alternative A3 continues west for 0.5 mile, then turns southwest after crossing County Road 434, where it continues for approximately 0.85 mile, crossing the Swan River at a previously disturbed bridge location, before rejoining the applicants' route. Route alternative A3 would cross an existing transmission line in two locations (once to cross over the existing transmission line and once to cross back). It does not include any transmission line ROW sharing, paralleling, or double-circuiting.

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Iron Range Substation

T-262
CR 480
CSAH 21
CR 492
CSAH 10
North Rd
Bass Lake
Swan River
T55 R24
T55 R23
Trout Lake Township
Maple Dr W
Little Sand Lake Unorganized Territory
Round Lake
Miscellaneous
Hardwood Rd
Sampson Lake
CR 445
CR 434
A1
A2
A3
CSAH 71
Evergreen Dr
T55 R24
T54 R24
Itasca County
CR 446
T55 R23
T54 R23
CR 447
Etno Lake
T-4206
A4
CR 436
AA15
T-1060
CR 566
Blackberry Township
T54 R24
T54 R23
Feeley Township
CR 481
Rice Lake
S Hummingbird Dr

Imagery Source: USDA-FSA-APFO NAIP, 2023

- Applicants' Proposed Route
- Route Width
- Route Alternative
- Alignment Alternative
- Route Alternative Width
- Existing Transmission Line
- Iron Range Substation
- Substation Siting Area
- Residence
- PWI Waterway
- PWI Basin
- Region Boundary

Feet
0 1,000 2,000

Map 3-2

IRON RANGE SUBSTATION REGION
Northland Reliability Project