Environmental Assessment

Palisade 115 kV Project

eDockets No. ET2/TL-15-423

Prepared by:

Minnesota Department of Commerce

Energy Environmental Review and Analysis

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Abstract

Under the Power Plant Siting Act, a route permit from the Minnesota Public Utilities Commission (Commission) is required to construct a high voltage transmission line. Great River Energy (applicant) filed an application with the Commission for a route permit to construct approximately thirteen miles of new 115 kilovolt (kV) overhead electric transmission line in Aitkin County, Minnesota. Great River Energy has proposed the project to provide electric service to Enbridge Energy's proposed Palisade Pump Station. Enbridge Energy proposes to construct the Palisade Pump Station on the east side of US Highway 169, south of 510th Lane as part of its proposed Line 3 Pipeline Replacement Project

Great River Energy submitted its route permit application on August 25, 2015. The application was filed pursuant to the alternative review process outlined in Minnesota Statute 216E.04 and Minnesota Rules 7850.2800–3900. On October 19, 2015, the Commission accepted the application as complete.

Department of Commerce (Commerce), Energy Environmental Review and Analysis (EERA) staff is responsible for conducting environmental review for route permit applications submitted to the Commission. Accordingly, EERA held a scoping meeting in Waukenabo Township on October 27, 2015, and prepared this environmental assessment (EA) for the Palisade 115 kV Project. This EA addresses the issues required in Minnesota Rules 7850.3700, subpart 4, and those identified in Commerce's December 23, 2015, EA Scoping Decision.

Following release of this EA, a public hearing will be held in the project area. The hearing will be presided over by an administrative law judge (ALJ) from the Office of Administrative Hearings. Upon completion of the environmental review and hearing process, the ALJ will compile a record of the public hearing, and public comments received, and present it to the Commission for its final permit decision. A decision on the route permit for the proposed project is anticipated in summer 2016.

Persons interested in this project can place their name on the project mailing list by contacting the Public Utilities Commission at docketing.puc@state.mn.us or 651-201-2204 to sign up.

Additional documents and information can be found on the EERA website at: http://mn.gov/commerce/energyfacilities/Docket.html?Id=34249 or the Minnesota eDockets webpage at: https://www.edockets.state.mn.us/EFiling/search.jsp by selecting "15" for year and "423" for number.

Acronyms, Abbreviations and Definitions

13 Line	Minnesota Power Cromwell to Riverton "#13" 115 kV electric transmission line
ALJ	administrative law judge
BMPs	best management practices
Breaker Station	Great River Energy's proposed Rice River Breaker Station
Commerce	Minnesota Department of Commerce
Commission	Minnesota Public Utilities Commission
CSAH	County State Aid Highway
dBa	A-weighted sound level recorded in units of decibels
DNR	Minnesota Department of Natural Resources
EA	environmental assessment
EERA	Energy Environmental Review and Analysis
ELF-EMF	extremely low frequency electromagnetic fields
EMF	electromagnetic field
Enbridge	Enbridge Energy, Limited Partnership
HVTL	high voltage transmission line
KHz	kilohertz
kV	kilovolt or 1,000 volts
Line 3 Project	Enbridge's proposed Line 3 Pipeline Replacement Project (PL9/PPL-15-137)
Minn. R.	Minnesota Rule
Minn. Stat.	Minnesota Statute
mG	milligauss
MHz	megahertz
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
NAC	noise area classification
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NEV	neutral-to-earth voltage
NLCD	National Land Cover Database
NLEB	Northern Long Eared Bat
NPDES/SDS	National Pollutant Discharge Elimination System /State Disposal System Construction Stormwater permit
NWI	National Wetland Inventory
OAH	Minnesota Office of Administrative Hearings
ppm	parts per million
Proposed Project	the Palisade 115 kV Transmission Project in this proceeding

pump station	Enbridge's proposed Palisade pump station along its proposed Line 3 Project
PWI	Public Waters Inventory
ROI	region of influence
ROW	right-of-way
scoping decision	EA Scoping Decision
SHPO	State Historic Preservation Office
subd.	subdivision (Minnesota Statute)
subp.	subpart (Minnesota Rule)
SWPPP	Stormwater Pollution Prevention Plan
UHF	ultra-high frequency
USACE	United States Army Corps of Engineers
VHF	very high frequency
WCA	Wetland Conservation Act
WMA	Wildlife Management Area

Contents

Tables

Figures

Appendices

1 Introduction

Great River Energy has made an application to the Minnesota Public Utilities Commission (Commission) for a route permit for the proposed Palisade 115 kV Project (Proposed Project). The permit application was made pursuant to the alternative review process outlined in Minnesota Statute 216E.04 and Minnesota Rules 7850.2800–3900. The Commission docket number for this project is ET2/TL-15-423.

The Minnesota Department of Commerce (Commerce), Energy Environmental Review and Analysis (EERA) staff is tasked with conducting environmental review on applications for route permits before the Commission.[1] The intent of the environmental review process is to inform the public, decision-makers, local governments, state agencies, and applicants of the potential impacts and possible mitigation measures associated with the proposed project.

This document is an environmental assessment (EA). It addresses the issues required in Minnesota Rule 7850.3700, subpart 4, and those identified in Commerce's December 23, 2015, EA Scoping Decision (scoping decision) (**Appendix A**), and is organized as follows:

Section 1 provides an overview of this document and the proposed project. It also provides a summary of the potential impacts of the project and potential mitigation measures.

Section 2 explains the regulatory framework associated with the proposed project, including the route permitting process and other permits and approvals required for the project.

Section 3 describes the project as proposed by Great River Energy, including rights-of-way, structures, and conductors

Section 4 describes the route alternatives and route segments evaluated in this report. The route alternatives evaluated include those proposed by Great River Energy in its application and those developed through the EA scoping process.

Section 5 details the potential impacts of the Proposed Project to both human and natural resources, and identifies measures that could be implemented to avoid, minimize or mitigate any identified adverse impacts.

Section 6 describes any unavoidable impacts, and irreversible or irretrievable commitment of resources resulting from the proposed project.

Section 7 assesses relative merits of each route alternative in comparison to the factors described in Minnesota Rule 7850.4100.

[1] Minn. Stat. 216E.04, subdivision 5.

1.1 Project Purpose

The Proposed Project is intended to provide electric service the proposed Palisade Pump Station. The Palisade Pump Station is proposed as part of the Line 3 Pipeline Replacement Project (Line 3 Project) proposed by Enbridge Pipeline, Limited Partnership (Enbridge) under Commission Docket (PL-9/PPL-15-137). Enbridge proposes to construct the Palisade Pump Station on the east side of US Highway 169, south of 510th Lane. Construction of the Proposed Project is dependent upon approval of the Line 3 Project along the route proposed by Enbridge. If the Line 3 Project is not approved, or if the approved pipeline route differs in the area of the proposed Palisade Pump Station, the Proposed Project will not be built.

1.2 Project Description

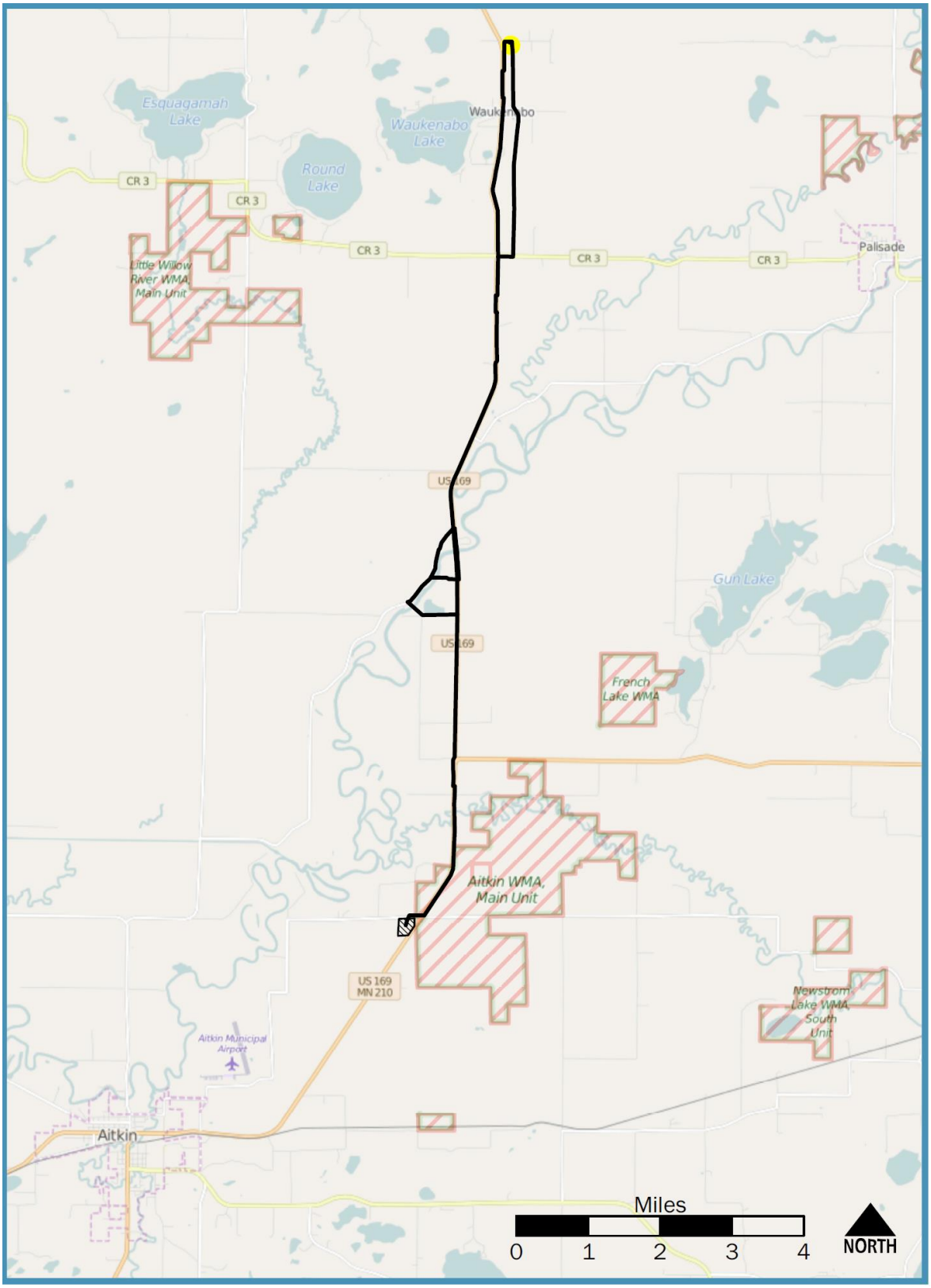
Great River Energy proposes to supply power to Enbridge's proposed Palisade Pump Station through a new overhead 115 kV transmission line connecting the pumping station with a new Rice River Breaker Station along Minnesota Power's existing Cromwell to Riverton 115 kV transmission line, referred to as the "13 Line." The length of the Proposed Project varies somewhat by route alternative, but is approximately 13 miles in length.

The Proposed Project is located in Spencer, Morrison, and Waukenabo townships in Aitkin County, Minnesota. **Table 1** summarizes the project location. **Figure 1** provides and overview of the Proposed Project.

Table 1: Project Location

Township	Range	Section	Political Township	County
47N	26W	3, 4, 9, 10	Spencer	Aitkin
48N	26W	2, 3, 10, 11, 14, 15, 22, 23, 26, 27, 34, 35	Morrison	Aitkin
49N	26W	11, 14, 23,26, 35	Waukenabo	Aitkin

Figure 1: Project Overview



Great River Energy's proposed route parallels US Highway 169 for the majority of the route. In its route permit application, Great River Energy proposed two route options for crossing the Mississippi River:

- East Crossing Option: this option would continue to parallel US Highway 169 across the Mississippi;
- West Crossing Option: approximately four miles north of the Rice River Breaker Station this option would turn west and then northwest to establish a new crossing of the Mississippi River before turning northeast for approximately one mile along County State Aid Highway 21 and continuing along US Highway 169.

Great River Energy requests a route width of 400 feet, 200 feet each side of the Highway 169 centerline, for the majority of the route. Great River Energy requests a wider route width to allow for some design flexibility in certain areas, as discussed in Section 3.1.

Great River Energy plans to acquire a 100-foot permanent easement (50 feet on each side of the transmission line centerline) for the majority of the route. In areas where guy wires and anchors are required, Great River Energy may acquire a slightly wider easement. In some areas with very limited clearance a much narrower easement, between 35 and 70 feet, may be acquired.

For the majority of the route Great River Energy anticipates using single-pole transmission structures with heights of 60 to 90 feet and spans of 275 to 450 feet between structures. In areas with rugged topography or sensitive natural features such as wetland or waterways, H-frame structures may be used to achieve longer spans, typically 600 to 800 feet between structures. In areas where the permitted route parallels existing electrical distribution circuits, distribution circuits may be buried or attached to Project structures.

The construction schedule for the Proposed Project is largely dependent upon the schedule for construction of Enbridge's proposed Line 3 Project. If the proposed Line 3 Project is not permitted, or if it is permitted along a different route, the Proposed Project will not be constructed. Great River Energy states that no construction activities on the Proposed Project will occur prior to a Commission decision on the proposed Line 3 Project.[2]

1.3 Sources of Information

Much of the information used in this EA derives from documents prepared by the applicant, including the Route Permit Application (application) and responses to questions from EERA staff (Appendix F). In addition to material provided by the applicant, information from scoping comments, relevant environmental review documents for similar projects, spatial data, and other state agencies was used to prepare this document.

[2] Great River Energy, response to Question 7, Appendix C

Information on the proposed Line 3 Pipeline Replacement Project and Sandpiper Pipeline Project was derived from information filed in those dockets.[3]

A number of spatial data sources, which describe the resources in the project area, were used in preparing this EA (**Appendix G**). 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 quantified, e.g., acres of forested wetlands within the anticipated project right-of-way.

[3] The complete record regarding the application for the proposed Line 3 Project can be found on the Minnesota eDockets webpage: https://www.edockets.state.mn.us/EFiling/search.jsp ("15" for year, "137" for number). Select information on the proposed Line 3 Project can be found on the EERA webpage: mn.gov/commerce/energyfacilities/Docket.html?Id=34709.
The complete record regarding the application for the proposed Sandpiper Project can be found on the Minnesota eDockets webpage: https://www.edockets.state.mn.us/EFiling/search.jsp ("13" for year, "474" for number). Select information on the proposed Sandpiper Project can be found on the EERA webpage: http://mn.gov/commerce/energyfacilities/Docket.html?Id=33599.

2 Regulatory Framework

In order to construct the Proposed Project, Great River Energy must obtain a route permit from the Commission. Additional approvals from other state and federal agencies with permitting authority for actions related to the project may also be required.

2.1 Certificate of Need

Because the Proposed Project will operate at a voltage greater than 100 kV and will have a length in Minnesota greater than 10 miles; the Proposed Project, per Minnesota Statute 216B.2421, is considered a large energy facility. Although large energy facilities typically require a certificate of need from the Commission, Great River Energy states that the Proposed Project is designed as a radial line to provide electricity to a single customer (Enbridge) at a single location (proposed Palisade Pump Station).[4] Great River states that the Proposed Project meets the exemption criteria for high voltage transmission lines proposed to serve a single customer at a single location identified under Minnesota Statute 216B.243 Subd.8 (2).[5]

2.2 Route Permit

No person may construct a High Voltage Transmission Line HVTL without first obtaining a route permit from the Commission.[6] A HVTL is defined as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 [kV] or more and is greater than 1,500 feet in length."[7] Associated facilities of a transmission line might include substations, buildings, equipment, guy wires, and other physical structures necessary for the operation of the HVTL.

The Proposed Project will operate at 115 kV and be approximately 13 miles in length.[8] As a result, the proposed project requires a route permit from the Commission.

Great River Energy filed its route permit application on August 25, 2015.[9] The application was filed pursuant to the alternative review process outlined in Minnesota Statute 216E.04 and Minnesota Rules 7850.2800–3900.

On October 19, 2015, the Commission issued an order accepting the application as complete.[10] After an application is accepted by the Commission, the permitting process can begin. The alternative review process requires environmental review. Once environmental

[4] Minnesota Statute 216B.243.
[5] Application, at p. 2-7
[6] Minn. Stat. 216E.03, subd. 1; Minnesota Rule 7850.1300, subpart 2.
[7] Minn. Stat. 216E.01, subd. 4.
[8] Application.
[9] Application.
[10] Minnesota Public Utilities Commission, *Commission Order Finding Application Complete, Granting Variance*, and Referring Application to Office of Administrative Hearings, October 19, 2015, eDockets No. 201510-114930-01 (hereinafter "Order")

review is completed, a public hearing will be held in the vicinity of the project area. The entire process generally takes six months, but can take up to nine months to complete.

2.3 Environmental Review

Applications for a HVTL route permit are subject to environmental review, which is conducted by EERA staff under Minnesota Rule 7850.3700. In preparing environmental review documents, EERA functions as the "responsible government unit" under the Minnesota Environmental Policy Act and related regulations. Besides preparing documents, EERA performs related tasks, including conducting scoping meetings and managing public comment periods.

The alternative review process requires preparation of an environmental assessment (EA).[11] An EA is a written document that contains an overview of the resources and potential human and environmental impacts and mitigation measures associated with the proposed project.[12] This is the only state environmental review document required for the project.[13] The EA must be completed and made publically available prior to the public hearing.

Scoping

The first step in the preparation of an EA is scoping. The scoping process has two primary purposes: (1) to ensure that the public has a chance to participate in determining what alternative routes or route segments are studied in the EA, and (2) to help focus the content of the EA on impacts and issues important to a reasoned route permit decision.

EERA conducts scoping meetings in conjunction with a public comment period to allow the public an opportunity to participate in the development of the scope (or content) of the EA.[14] The commissioner of Commerce determines the scope of the EA,[15] and may include alternative routes or route segments suggested during the scoping process if it is determined the alternatives would aid the Commission in making a permit decision.[16] Applicants are provided the opportunity to respond to each request that an alternative be included in the EA.[17]

Scoping Process

In accordance with Minnesota Rule 7850.3700, subpart 2, EERA staff initiated the scoping process for this EA. On October 7, 2015, Commission staff sent notice of the place, date and time of the public information and scoping meeting to those persons on the project contact list and agency technical representative list, as well as local government units and affected

11 Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 1.
12 Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3700, subp. 4.
13 Minn. Stat. 216E.04, subd. 5.
14 Minn. R. 7850.3700, subp. 1.
15 Minn. R. 7850.3700, subp. 3.
16 Minn. R. 7850.3700, subp. 2.
17 Id.

landowners.[18] Notice was published in the *Aitkin Independent Age* on October 14, 2015,[19] and on both the Commission and EERA webpages

Public Meeting

Commission and EERA staff held the public information and scoping meeting as noticed on October 27, 2015, at Waukenabo Town Hall in Palisade, Minnesota. The purpose of this meeting was to provide information to interested persons about the proposed project, to answer questions about the proposed project and the permitting process, and to allow the public an opportunity to suggest impacts, mitigation measures, and alternatives that should be considered in the EA. A court reporter was present at the meeting to document oral statements.[20]

Approximately 30 members of the public attended the meeting and five people asked questions and provided comments about the project. Public comments addressed the proposed location of the transmission line, right-of-way width and location, tax treatment of the project, economic impacts to landowners from the project, and health impacts from the project.

Participants at the meeting suggested investigating an alternative alignment that would move the Mississippi River crossing to the east side of US 169.

At the public information and scoping meeting one commenter suggested that an alternative routing option along the proposed Enbridge pipeline route be evaluated in the northern portion of the route.[21]

Public Comments

A public comment period, ending November 10, 2015, provided the opportunity to submit written comments to EERA on the scope of the EA. The purpose of this comment period was to allow for interested persons to suggest impacts, mitigation measures, and alternatives that should be considered in the EA. Written comments were received from the Minnesota Department of Natural Resources (DNR), the Minnesota Department of Transportation (MnDOT), and Great River Energy.[22]

DNR comments requested the EA discuss the potential impacts to avian species, wetlands, and forested areas from construction and operation of the project. DNR also identified

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18 Minnesota Public Utilities Commission and Minnesota Department of Commerce, Notice of Public Information and Environmental Assessment Scoping Meeting, October 7, 2015, eDockets Nos. 201510-114655-01, 201510-114655-02.

19 Affidavit of Publication, November 25, 2015, *Aitkin Independent Age*, October 14, 2015. eDocket No. 201511-115977-01

20 Oral Comments, Public Info-Scoping Meeting 10-27-15, November 19, 2015, eDockets No. 201511-115822-01.

21 Id., at pp. 52-57

22 DNR Scoping Comments, November 10, 2015, eDockets No. 201511-115613-01, 201511-115613-02, 201511-115613-03.

Great River Energy Scoping Comments, November 10, 2015, eDockets No. 201511-115623-01.

several methods to mitigate potential avian and vegetation impacts to be evaluated in the EA. DNR comments also request that the EA address cumulative impacts.

MnDOT comments note the proximity of the proposed route to US Highway 169 and request that the EA identify impacts to the continued safety of the state highway trunk system that may result from design, construction and maintenance of the project. MnDOT also requested that the EA identify any additional costs to the state highway system that may result from the location of the project.

Great River Energy proposed a new alternative crossing of the Mississippi River during the scoping comment period.

Scoping Decision

Minnesota Rule 7850.3700, subpart 3, requires Commerce to determine the scope of the EA within 10 days after the close of the public comment period. However, Minnesota Statute 216E.04, subdivision 5, anticipates Commission input into identifying alternative routes or route segments for inclusion in the scope of the EA. The Commission extended the 10-day timeframe to allow for Commission input.[23]

On November 19, 2015, EERA staff provided the Commission with a summary of the scoping process.[24] The summary indicated that EERA staff would recommend to the Deputy Commissioner that the scoping decision for the proposed project should include the route segment along the proposed Line 3 route that was proposed at the October 27, 2015, Public Meeting and the alternative river crossing proposed by Great River Energy in its letter of November 10, 2015.

On December 17, 2015, the Commission considered what action, if any, it should take regarding the alternatives put forth during the scoping process. The Commission elected to take no action on the route alternatives EERA proposed to recommend to the Deputy Commissioner in its November 19, 2015, scoping summary to the Commission.

After considering public comments, input from the Commission, and recommendations from EERA staff, the Deputy Commissioner of Commerce issued a scoping decision on December 23, 2015 (**Appendix A**).[25] The scoping decision identifies the issues and routes or route segments to be evaluated in this EA. EERA staff provided notice of the scoping decision to

[23] Minnesota Public Utilities Commission. Order Finding Application Complete, Granting Variance, and Referring Application to the Office of Administrative Hearings. October 19, 2015. eDockets No. 201510-114930-01

[24] Minnesota Department of Commerce, *Scoping Process and Route Alternatives*, November 19, 2015, eDockets No. 201511-115826-01 .

[25] Minnesota Department of Commerce (December 23, 2015) *Environmental Assessment Scoping Decision*, eDockets No. 201512-116740-01.

those persons on the project mailing list[26] and to landowners along the additional route segments included in the Scoping Decision.[27]

2.4 Public Hearing

The Commission is required by Minnesota Rule 7850.3800, subpart 1, to hold a public hearing once the EA is complete. A hearing for the Proposed Project is scheduled to be held:

Thursday, May 5, 2016
6:00 p.m.
Waukenabo Town Hall
26797 Grove Street
Palisade, MN 56469

The hearing will be noticed separately from notice of the availability of this EA.

The hearing will be presided over by an administrative law judge (ALJ) James Mortenson from the Office of Administrative Hearings. Interested persons will have the opportunity to speak at the hearing, present evidence, ask questions, and submit comments. The ALJ will provide a report to the Commission summarizing the public hearing and any spoken or written comments received. Comments received during the hearing on the EA become part of the record in the proceeding. EERA staff will respond to questions and comments about the EA at the public hearing, but staff is not required to revise or supplement the document.[28]

2.5 Permit Decision

The Minnesota Legislature directed the Commission to select HVTL routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.[29] An HVTL route must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.[30]

Route permits issued by the Commission include a permitted route and anticipated alignment. The route permit also outlines conditions specifying construction and operation standards. A draft route permit for the Proposed Project was submitted into the project record on April 19, 2016 and is included as **Appendix B** of this document.[31] An example of a route permit previously issued by the Commission is included in **Appendix C**.

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26 Minnesota Department of Commerce (December 23, 2015) *Notice of Environmental Assessment Scoping Decision*, 2015, eDockets No. 201512-116755-01

27 EERA. Letter to Landowners of Additional Routes Under Consideration. January 14, 2015, eDocket No. 20161-117268-01, and February 23, 2016, eDocket No. 20162-118604-01

28 Minn. R. 7850.3800, subp. 4.

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

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

31 Public Utilities Commission, Draft Route Permit, April 19, 2016, eDocket no. 20164-120256-01

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must take into account when designating a route for a HVTL. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the Commission must consider when making a permit decision. These factors include:

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

B. effects on public health and safety;

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

D. effects on archaeological and historic resources;

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

F. effects on rare and unique natural resources;

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

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

I. use of existing large electric power generating plant sites;

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

K. electrical system reliability;

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

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

N. irreversible and irretrievable commitments of resources.

At the time the Commission makes a final decision about the permit application, it must determine whether the EA and the record created at the public hearing address the issues identified in the scoping decision.[32] The Commission must also make specific findings that it has considered locating a route for a new HVTL along an existing HVTL route or parallel to existing highway rights-of way, and, to the extent these are not used for the route, the Commission must state the reason why they are not used.[33]

[32] Minn. R. 7850.3900, subp. 2.
[33] Minn. Stat. 216E.03, subd. 7(e).

The Commission must make a final decision on the route permit within 60 days after receipt of the ALJ report.[34] A final decision must be made within six months after the Commission's determination the application is complete; however, this time limit may be extended for up to three months for just cause or upon agreement of the applicant.[35] A decision by the Commission on a route permit application for the Proposed Project is anticipated in the summer of 2016.

If issued a route permit by the Commission, Great River Energy may exercise the power of eminent domain to acquire land for the project.[36]

2.6 Other Permits and Approvals

A route permit from the Commission is the only state permit required for the routing of the project. The Commission's route permit supersedes local planning and zoning and binds state agencies.[37] Thus, state agencies are required to participate in the Commission's permitting process to aid the Commission's decision-making and to indicate routes that are not permittable.[38]

Should the Commission issue a route permit, various federal, state, and local permits may be required for activities related to the construction and operation of the Proposed Project. All permits subsequent to the Commission's issuance of a route permit and necessary for the project (commonly referred to as "downstream permits") must be obtained by a permittee. Table 2 includes a list of downstream permits that may be required for the Proposed Project.

[34] Minn. R. 7850.3900, subp. 1.
[35] Id.
[36] Minn. Stat. 216E.12.
[37] Minn. Stat. 216E.10.
[38] Id.

Table 2: Potential Permits and Approvals

Federal	
U.S. Army Corps of Engineers	Section 404 of the Federal Clean Water Act
	Section 10 of the Rivers and Harbors Act
U.S. Fish and Wildlife Service	Threatened and Endangered Species Consultation
State	
Pollution Control Agency	National Pollutant Discharge Elimination System Permit
Department of Natural Resources	License to Cross Public Lands and Waters
	Endangered Species Consultation
Department of Transportation	Utility Accommodation on Trunk Highway
Local	
County, Township	Wetland Conservation Act Review, Road Crossing and Right-of-Way, Land and Building, Overwidth Load, and Driveway and Access Permits
Other	
Other Utilities	Crossing Permit

Federal

The United States Army Corps of Engineers (USACE) "regulates the discharge of dredged or fill material into waters of the United States, including wetlands."[39] Dredged or fill material, including material from construction sites, could impact water quality. A permit is required from USACE if the potential for significant adverse impacts exists.

A permit is required from the United States Fish and Wildlife Service (USFWS) for the incidental "taking"[40] of any endangered species. As a result, USFWS encourages project proposers to consult with the agency to determine if a project has the potential to impact federally-listed threatened and endangered species. Additionally, consultation can lead to the identification of general mitigation measures for the proposed project.

State

Aitkin County oversees local implementation of the Wetland Conservation Act (WCA). The WCA requires that any person "proposing to impact a wetland to first, attempt to avoid the impact; second, attempt to minimize the impact; and finally, replace any impacted area with another wetland of at least equal function and value."[41]

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

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

41 Minn. R. 8420.0100, subp. 2.

Construction projects that disturb one or more acres of land require a general National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater permit from the Minnesota Pollution Control Agency. This permit is issued to "construction site owners and their operators to prevent stormwater pollution during and after construction."[42] The NPDES/SDS permit requires (1) use of best management practices, (2) development of a Stormwater Pollution Prevention Plan (SWPPP), and (3) adequate stormwater treatment capacity once the project is complete.

Potential impacts to state lands and waters and fish and wildlife resources are regulated by DNR. Utilities are required to obtain a crossing license to cross state lands and waters.[43] Not unlike the USFWS, DNR encourages project proposers to consult with the agency to determine if a project has the potential to impact state-listed threatened and endangered species. Additionally, consultation can lead to the identification of general mitigation measures for the proposed project.

2.7 Applicable Codes

All transmission lines, regardless of route location, must meet requirements of the National Electrical Safety Code (NESC) for High Voltage Transmission Lines.[44] NESC standards are designed to safeguard human health "from hazards arising from the installation, operation, or maintenance of … overhead and underground electric supply and communication lines."[45] They also ensure that the transmission line and all associated structures are built from materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided routine operational maintenance is performed.

Route Permits require permittees to comply with North American Electric Reliability Corporation (NERC) standards (**Appendices B** and **C**). NERC standards define the reliability requirements for planning and operating the electrical transmission grid in North America.[46]

2.8 Issues Outside the Scope of the EA

Consistent with the scoping decision for this EA (**Appendix A**), this document does not address the following topics:

- Any alternative not specifically identified in the scoping decision.

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42 Minnesota Pollution Control Agency (November 19, 2015) *Stormwater Program for Construction Activity*, Retrieved December 9, 2015, from: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html.

43 Minn. Stat. 84.415.

44 *See* Minn. Stat. 326B.35; Minn. R. 7826.0300, subp. 1 (requiring utilities to comply with the most recent edition of the NESC when constructing new facilities or reinvesting capital in existing facilities); *see also* Appendix C Generic Route Permit Template, Section 4.4.1 (requiring compliance with NESC standards).

45 IEEE Standards Association (n.d.) C2-2002 – National Electrical Safety Code 2002 Edition, http://standards.ieee.org/findstds/standard/C2-2002.html.

46 North American Electric Reliability Corporation (n.d.) *Standards*: http://www.nerc.com/pa/stand/Pages/default.aspx.

- A no-build alternative.
- Issues related to project need, size, type or timing.
- Impacts of specific energy sources.
- The manner in which landowners are compensated for ROW easements.

3 Proposed Project and Route Alternatives

Section 3 describes the Proposed Project including the requested route width, right-of-way, construction, operation and maintenance, anticipated costs and schedule. Route segments and route alternatives evaluated in this document are described in Section 4.

3.1 Route Width

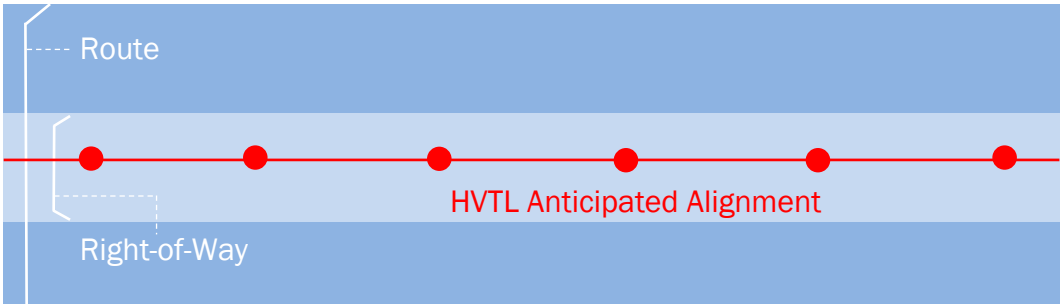
When the Commission issues a route permit for a HVTL, the Commission approves a route, a route width, and an anticipated alignment within that route (**Figure 2**). Minnesota Statute 216E.01, subdivision 8, defines "route" as "the location of a [HVTL] between two end points. The route may have a variable width of up to 1.25 miles." The route width is typically wider than the actual ROW needed for the HVTL. This extra width provides flexibility in constructing the transmission line, but is not so wide that it is impossible to determine where the transmission line would be constructed. The approved HVTL must be constructed within the Commission's designated route and along the anticipated alignment unless subsequent permissions are requested and approved by the Commission.[47]

Great River Energy requests a route width of 400 feet, 200 feet each side of the road centerline, or 200 feet each side of the proposed alignment for portions of the route that do not follow a road, for the majority of the route.[48] Great River Energy requests a wider route width to allow for some design flexibility in the following areas:

- **Palisade Pump Station:** Great River Energy requests a route width of approximately 825 feet in the area around Enbridge's proposed Palisade Pump Station. Detailed information on the specific location and design of the proposed pump station is not available at this point, and a greater route width in this area would provide design flexibility to accommodate the final location and design of the proposed pump station.
- **U.S. Highway 169 Mississippi River Crossing**: Great River Energy requests a variable route width in this area to address design challenges related to existing residential structures and uncertainty related to MnDOT permitting requirements. Great River Energy has identified a route width that tapers from 850 feet beginning at 435th Lane to 650 feet at the junction of US Highway 169 and Great River Road/CR 21.
- **Alternative River Crossing (Route Segment H)**: Great River Energy requests a route width of approximately 700' to provide for the flexibility to have an alignment on either side of the buildings that are located on the property.
- **Rice River Breaker Station**: Great River Energy proposes a route width of approximately 1,200 feet to provide flexibility to modify the transmission alignment to match the final breaker station location and layout.

47 Minn. Stat. 216E.03, subd. 2; s*ee also* Appendices B and C.
48 Application, at pp. 4-1, -4-4

Figure 2: Route and Right-of-Way Illustration*



*Not to scale.

3.2 Right-of-Way Requirements

Minnesota Rule 7850.1000, subpart 15, defines "right-of-way" (ROW) as the "land interest required within a route for the construction, maintenance, and operation" of a HVTL. The National Electric Safety Code (NESC) establishes clearance requirements for objects, including vegetation, to ensure that the conductor will not contact objects during high wind events.

For most of its length the Proposed Project will use Great River Energy's standard ROW for 115 kV transmission lines is 100 feet (50 feet on either side of the transmission line centerline). Select locations may require a slightly wider ROW to accommodate transmission line guy wires and anchors. In certain areas where clearance is very limited by existing infrastructure (e.g. existing buildings), transmission right-of-way may be reduced to 35 feet on one or both sides of the centerline; Great River Energy has not yet identified any areas along the evaluated routes where narrower ROW would be required.[49]

3.3 Temporary Easements

In addition to permanent easements for the operation and maintenance of the transmission line, Great River Energy anticipates negotiating voluntary short-term agreements for the use of temporary work space for one or more marshalling yards for use in staging construction or storage of structures, vehicles, equipment and supplies. Marshalling yards are generally sited on previously disturbed or developed areas.

3.4 Rice River Breaker Station

Great River Energy proposes to construct the Rice River Breaker Station near the southwest intersection of U.S. Highway 169 and 390th Street (**Figure 1, Appendix D**). The new Rice River Breaker Station would tap Minnesota Power's existing Cromwell to Riverton "13 Line" to supply power to the proposed Palisade Pump Station.

[49] Application, at p. 4-4; GRE Response, see Appendix F

The proposed location for the breaker station is currently an agricultural field. **Figure 3** shows a typical breaker station of the type proposed in this application. The footprint of the breaker station would be approximately 15,000 square feet.[50] The developed area of the breaker station would be enclosed by a seven-foot chain link fence with a security wire cap. There will be one 30-foot gate to access the fenced area. The yard within the fenced area, will be surfaced with crushed granite. Preliminary design of the breaker station anticipates that it will include the following equipment:

- Galvanized steel structures with heights of between seven to 100 feet. A single 100-foot shield mast will protect the breaker station from lightning strikes. There will be three two-legged 70-foot tower structures to tie the transmission lines into the breaker station.
- Three high voltage circuit breakers to protect the transmission system from overloads and provide a means for switching.
- Energized aluminum buswork with a height of between 14 and 22 feet.
- A metal-clad electrical equipment enclosure of approximately 24 by 36 feet with a height of 12 feet to house relaying and control equipment. A light above the doors at of the equipment enclosure would be the only permanent light sources at the breaker station.

Access to the breaker station would be from a 260-foot drive off of County Road 54. Preliminary design anticipates installation of a parking area of approximately 2,000 square feet near the fenced area. Both the drive and parking area would be surfaced with gravel.[51]

[50] Application, at p. 7-8
[51] Great River Energy, response to Question 1, Appendix F

Figure 3: Typical Great River Energy Breaker Station

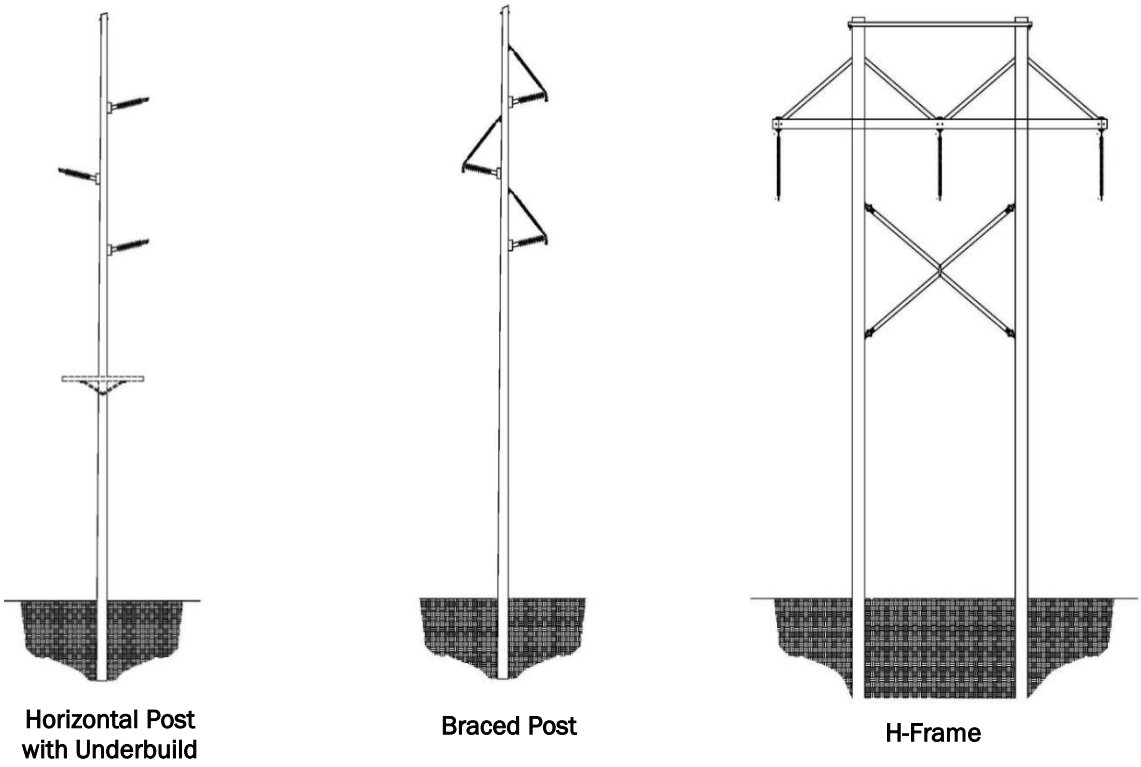
3.5 Transmission Structures

Great River Energy proposes to use primarily single pole wood, steel, or ductile iron structures. These structures have a typical above-ground height of 60 to 90 feet, diameter of approximately 20 inches at ground level, and spacing of approximately 275 to 400 feet between structures.[52] Illustrations of proposed structure types are shown in **Figure 4**

Structure heights and spans are dependent upon several factors such as topography, highway crossings, river or stream crossings, proximity of structures within or near the ROW, and angle structures. In certain locations, structures may be equipped with guy wires for support as necessary.

[52] Application, at p. 4-4

Figure 4: Typical Transmission Line Structure Types[53]



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In addition to the single pole structures anticipated for the majority of the route, Great River Energy proposes using H-frame structures in some areas. The proposed H-frame structures would be 60 to 90 feet in height and have average spans of 600 to 800 feet, and up to 1,000 feet in certain topography. Taller structures would be required for exceptionally long spans or locations requiring additional vertical clearance exceeding NESC standards. H-Frame structures can be used in situations where longer span lengths may avoid or minimize impacts to sensitive areas such as wetlands or water crossings, or where topography is particularly challenging.

Portions of the route will parallel existing distribution lines. In areas of the route where the Proposed Project coincides with distribution lines, the existing distribution lines may be buried, or may be moved from their existing structures onto the new structures used by the Proposed Project

53 Adapted from Application, Figure 4-2

The Proposed Project is a single-circuit transmission line. The structures will carry one conductor per phase (also referred to as an unbundled conductor) for a total of three conductors and a shield wire. Great River Energy anticipates using a 477 26/7 aluminum conductor steel reinforced conductor.[54]

The Proposed Project design will meet or exceed clearance and strength requirements outlined in the NESC. Great River Energy anticipates the service life of the Proposed Project will be at least 40 years.[55]

Great River Energy anticipates an annual availability of approximately 99.9 percent for the Proposed Project. Any transmission line outages would comply with NERC transmission grid reliability requirements, and be coordinated with MISO, the region's independent transmission system operator, and Minnesota Power, the owner and operator of the 13 Line.

The Proposed Project will be equipped with circuit breakers at the proposed breaker station that will de-energize the transmission line should an accident occur, such as a structure or conductor fall to the ground.

3.6 Construction

Construction will not begin until all approvals are obtained and land rights secured. The construction timeline is dependent upon a number of factors including final surveys and project design, receipt of approvals and reviews, weather, and the availability of labor and materials.

Great River Energy anticipates that easement acquisition and design will be put on hold for an unknown amount of time as Enbridge's Line 3 route permit application undergoes review by the Commission. No construction activities will occur on the Proposed Project prior to a route permit determination on the Line 3 Project by the Commission.[56]

In its application, Great River Energy has committed to employing standard construction and mitigation practices developed from experience and industry-specific Best Management Practices (BMPs) that address ROW clearing and transmission line construction. Great River Energy has committed to advising contractors of its BMPs.[57]

3.6.1 Right-of-Way Acquisition

Upon issuance of a Route Permit from the Commission, Great River Energy will conduct a design survey to establish a detailed transmission line alignment and ROW that is consistent with the Commission's permit. This will be followed by acquisition of permanent easements for the required ROW along the entire permitted route. Depending upon the route selected, the Proposed Project will require approximately 13 to 14 miles of new ROW. The permanent

54 Application, at p. 4-7
55 Application, at p 4-7
56 Great River Energy, response to Question 7. See Appendix F.
57 Application, at Section 6.4

ROW could cross both private and state land. No tax-forfeited land has been identified along any route alternatives.[58]

Private Land

During easement acquisition Great River Energy will provide landowners with a number of documents, including a copy of the route permit, a draft transmission line easement and offer of compensation, and information about the project schedule and construction practices. Landowners and utilities typically negotiate easement terms that reduce negative impacts to a landowner's property and provides just compensation for the utility's use of the easement.[59]

In some instances a negotiated agreement cannot be reached between the landowner and the utility. Should this occur the utiltiy may use the eminent domain process to reach a settlement.[60] In the eminent domain process, an independent panel of three court-appointed commissioners will determine the value of the easement, and both the landowner and the applicant are bound by this determination. If the eminent domain process is used, the utility must obtain at least one appraisal for the property proposed to be acquired.[61]

State of Minnesota Land

Portions of all of the evaluated routes will cross state land. The procedures for acquiring rights to occupy public land are different than acquiring an easement across private land.

Utilities crossing over, under or across any state lands or public waters must first obtain a Utility Crossing License from the Division of Lands and Minerals within the DNR. The license is usually granted for 25 to 50 years, and may be renewed when it expires.[62] To apply for an easement, the applicant must file an *Application for License to Cross Public Lands and Waters*.[63]

Great River Energy proposes to locate the majority of the Proposed Project along U.S. Highway 169. The Proposed Project must be routed and designed to ensure that both the roadway system and the transmission project can be operated and maintained in a safe and reliable manner. The Minnesota Department of Transportation (MnDOT) is responsible for ensuring the safe operation and maintenance of the roadway system. MnDOT has adopted policy and procedures, referred to as the *Utility Accommodation Policy*, for accommodating

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58 Great River Energy Response, see Appendix F

59 Minnesota Department of Commerce (August 5, 2014) *Rights-of-Way and Easements for Energy Facility Construction and Operation*, Retrieved December 8, 2015, from: http://mn.gov/commerce/energyfacilities/documents/Easements%20Fact%20Sheet_08.05.14.pdf.

60 *See generally* Minn. Stat. 117.

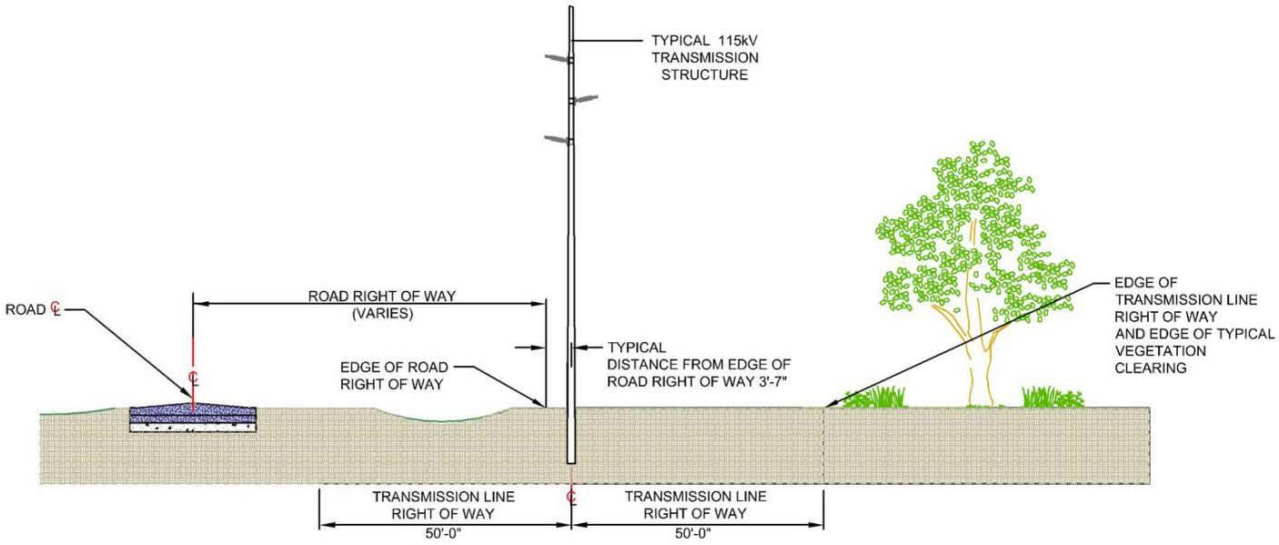
61 Minn. Stat. 117.036, subd. 2.

62 Minnesota Department of Natural Resources (n.d.) *Utility Crossing Licenses*, from: http://dnr.state.mn.us/permits/utility_crossing/index.html. Procedures for crossing of public lands and waters are outlined in Minnesota Statute 84.415 and Minnesota Rule 6135.

63 Minnesota Department of Natural Resources (June 13, 2015) *Application for License to Cross Public Lands and Waters*, Retrieved October 22, 2015 from: http://files.dnr.state.mn.us/lands_minerals/utility/utility_crossing_application.pdf.

utilities on highway ROWs.[64] The *Utility Accommodation Policy* generally allows utilities to occupy portions of highway rights-of-way 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. To the extent possible, Great River Energy seeks to parallel existing ROWs, and looks for opportunities to share road ROW in a manner that ensures continued safe operation of both the electric transmission network and the transportation network. **Figure 5** provides a conceptual illustration of ROW sharing between roadway and transmission networks.

Figure 5: Transmission and Road ROW Schematic



3.6.2 Vegetation Removal

Construction begins by removing trees and other vegetation from the ROW that will interfere with the safe operation of the transmission line. The disposition of existing vegetation within the surveyed ROW would be spelled out in easement agreements between Great River Energy and landowners. Great River Energy's general practice is to allow low-growing brush or tree species at the outer edges of the ROW. In landscaped areas, Great River Energy will consider landowner requests to allow existing low-growing vegetation to remain within the ROW as part of the easement negotiation. In no case would Great River Energy allow vegetation within the ROW that may impede the safe construction, operation, and maintenance of the Proposed Project.

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64 MnDOT ((2013), *Utility Accommodation on Highway Right of Way.* http://www.dot.state.mn.us/policy/operations/op002.html
See also: MnDOT, *Utility Accommodation and Coordination Manual* (December 2013) http://dotapp7.dot.state.mn.us/cyberdocs_guest/autopapiact.asp?AppINT=-1&mode=no&autopapiurl=%2Fcyberdocs%5Fguest%2FLibraries%2FDefault%5FLibrary%2FGroups%2FGUESTS%2Fviewdocact%2Easp%3Flib%3DMNDOT%5FDOCS%26doc%3D1401425%26noframes%3Dyes&SCICO=false

Great River Energy may, if such language is included in an easement agreement, trim or remove unhealthy trees immediately adjacent to the transmission line ROW. Unhealthy trees near the ROW (commonly known as "danger trees") have the potential to endanger the line by falling on it.[65] All cleared vegetation will be chipped in the ROW, stacked in the ROW for use by the property owner, or otherwise disposed of in accordance with the property owner's easement agreement.[66]

Standard Commission route permit conditions require permittees to minimize tree removal and preserve windbreaks, shelterbelts and vegetation generally (**Appendices B** and **C**).

3.6.3 Structure Installation

Transmission line structures will be installed directly into the ground at or near the existing grade. As a result, structure locations will not be graded or leveled unless it is necessary for construction activities. Upon completion of necessary grading, holes will be augured or excavated. These holes will be from eight to 11 feet deep and two to three feet in diameter depending on soil conditions. The average structure depth for a 70-foot pole would be approximately nine feet. Once the hole is dug, structures are set and the holes backfilled with excavated material, native soil, or crushed rock. Excess soil is spread evenly near the structure or removed and disposed off-site. In poor soil conditions, galvanized steel culverts are buried vertically surrounding the structure. Great River Energy may use concrete foundations of four to eight feet in diameter in limited instances. Where concrete foundations are used, concrete trucks form a local concrete batch plant would deliver concrete to the location of the structure.

Once structures are installed, conductors are strung along the line. Setup areas of approximately one-third of an acre will be established approximately every two miles along the route. Conductors and a shield wire are strung and, once appropriate tension is obtained, secured to each structure. Temporary guard or clearance structures are installed as needed to provide adequate clearance over roads, existing lines, or other potential obstructions, as well as to protect the transmission line. Stringing activities will only occur after necessary notifications are made and permits obtained.[67]

The Proposed Project will cross several wetlands and waterways. In its application, Great River Energy has committed to avoiding the use of construction equipment in these areas to the extent possible; equipment crossings of these resources in order to place poles and string conductors will be limited and undertaken only after discussion with resources agencies.[68] Where waterways must be crossed to pull conductors and shield wires, Great River Energy will minimize potential impacts by crossing by foot, using boats, or crossing across ice during winter conditions.[69] Great River Energy will employ BMPs to prevent soil erosion and establish equipment fueling and lubrication locations away from waterways.

[65] Application, at p 6-2
[66] Application, at p. 6-2
[67] Application, at p. 6-4
[68] Id.
[69] Id.

Standard Commission route permit conditions require permittees to minimize impacts to wetland and water resources (**Appendices B** and **C**).

3.6.4 Restoration

Great River Energy will restore disturbed sections of the ROW or temporary work area(s) to pre-construction conditions to the greatest extent practicable. Restoration also includes removal of debris and all temporary facilities, employing erosion control measures, and reseeding with appropriate seed mixes, that is, similar types of vegetation, certified free of noxious and invasive weeds. In areas that have experienced soil compaction as a result of construction activities, the construction crew or a restoration contractor will alleviate compaction as negotiated with the landowner.[70]

After construction is complete, a ROW agent will contact landowners to determine if restoration has been completed to their satisfaction identify damages, if any, which may have occurred during construction. Great River Energy it will compensate the landowner for any damages or hire a contractor to restore damaged property.[71]

3.7 Operation and Maintenance

Once the transmission line is constructed, Great River Energy personnel will use the ROW to perform inspections and conduct maintenance and repairs. Regular (yearly) inspections throughout the life of the transmission line are necessary to identify needed maintenance activities and repairs, which will ensure the continued integrity of the transmission line. Great River Energy personnel will inspect the transmission line using snowmobile, all-terrain vehicle, pickup truck or by foot.

Great River Energy typically inspects 115 kV transmission lines every two years to determine vegetation management needs. Vegetation that will interfere with the safe operation of the transmission line will be removed by hand-clearing or mechanical means. Herbicides will also be used if allowed. Native vegetation that will not interfere with travel along the ROW or the safe operation of the transmission line will be allowed to reestablish.[72]

Great River Energy's standard maintenance schedule for a breaker station anticipates an annual check of the major components, including the batteries. On five to six year intervals, all components are tested to ensure performance according to specifications. General site maintenance (e.g. cutting grass, weed control, fence inspection) is done on an as-needed basis throughout the year.

[70] Application, Section 6.5
[71] Id.
[72] Application, Section 6-6

3.8 Estimated Service Life and Availability

Great River Energy estimates the service life of the Proposed Project to be at least 40 years. Great River Energy estimates an average annual availability of the Proposed Project of 99.9 percent.[73]

3.9 Cost

Great River anticipates an approximate construction cost of the Proposed Project of between $13 and $13.3 million dollars. Variability of the estimated construction cost for the Proposed is largely dependent upon the length of the transmission line. Great River Energy estimates the construction cost using single pole structures to be approximately $498,000 per mile and $550,000 for portions using H-frame structures. Construction in sensitive areas, such as wetlands and water crossings would add additional costs of $50,000 or more per mile.[74]

Annual operation and maintenance costs, including ROW maintenance, are anticipated to be $2,000 per mile.[75]

3.10Schedule

Construction of the Proposed Project is dependent upon whether the Commission issues a permit including a Palisade Pump Station for Enbridge's proposed Line 3 Pipeline Replacement Project. If no permit is issued for the Line 3 Project, or if the Line 3 Project is issued along a route that does not include the proposed Palisade Pump Station, the Proposed Project would not be constructed.

The timing of construction of the Proposed Project is dependent upon the timing of a Commission decision on the proposed Line 3 Project. Commencement of construction of the Proposed Project would not commence before a Commission order issuing a route permit for the Line 3 Project including a Palisade Pump Station. If the Palisade Pump Station is permitted as part of the Line 3 Project, Great River Energy would plan to schedule construction of the Proposed Project to be concurrent with Enbridge's construction of the proposed Palisade Pump Station. Easement acquisition and final design would be delayed until there is more certainty as to routing of the proposed Line 3 Project. Construction of the Proposed Project would not commence until a permit is issued for the proposed Line 3 Project.

Great River Energy anticipates that construction of the Proposed Project will take place over approximately eight months.[76]

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73 Application, at p. 4-7.
74 Application, at p. 4-9
75 Id.
76 Application, at 4-10

4 Route Alternatives

In its application, Great River Energy proposed two routing options, referred to in the application as the East and West options.[77] The East and West options are the same for most of their respective length, 13 and 13.5 miles, but include alternative crossings of the Mississippi River.

In addition to the river crossing alternatives proposed in the application, an additional river crossing and a new route segment connecting the final portion of the route to the proposed Palisade pumping station were proposed during the scoping period.

The three alternative river crossings and the two alternative connections to the proposed Palisade Pump Station can be combined to produce six route alternatives. All route alternatives share some portions in common. In order to analyze the routes, EERA staff identified nine unique route segments, described in Section 4.1, and then combined these into six route alternatives, described in Section 4.2.

4.1 Route Segments

In order to calculate impacts of the various route alternatives, EERA staff has broken down the route alternatives into nine unique route segments shown in **Figure 6** and summarized in **Table 3**. For purposes of consistency, and because some segments are shared by multiple route alternatives, EERA staff has labeled these segments alphabetically. All route segments were included in the Scoping Decision, although the Scoping Decision sometimes referred to them by different names (see segment description in **Table 3**). Impacts by route segment are generally not specified in the text of this document, but are included in the tables shown in **Appendix E**, and are described generally in Sections 5 and 7.

[77] Application, at p. 1-7

Figure 6: Route Segments

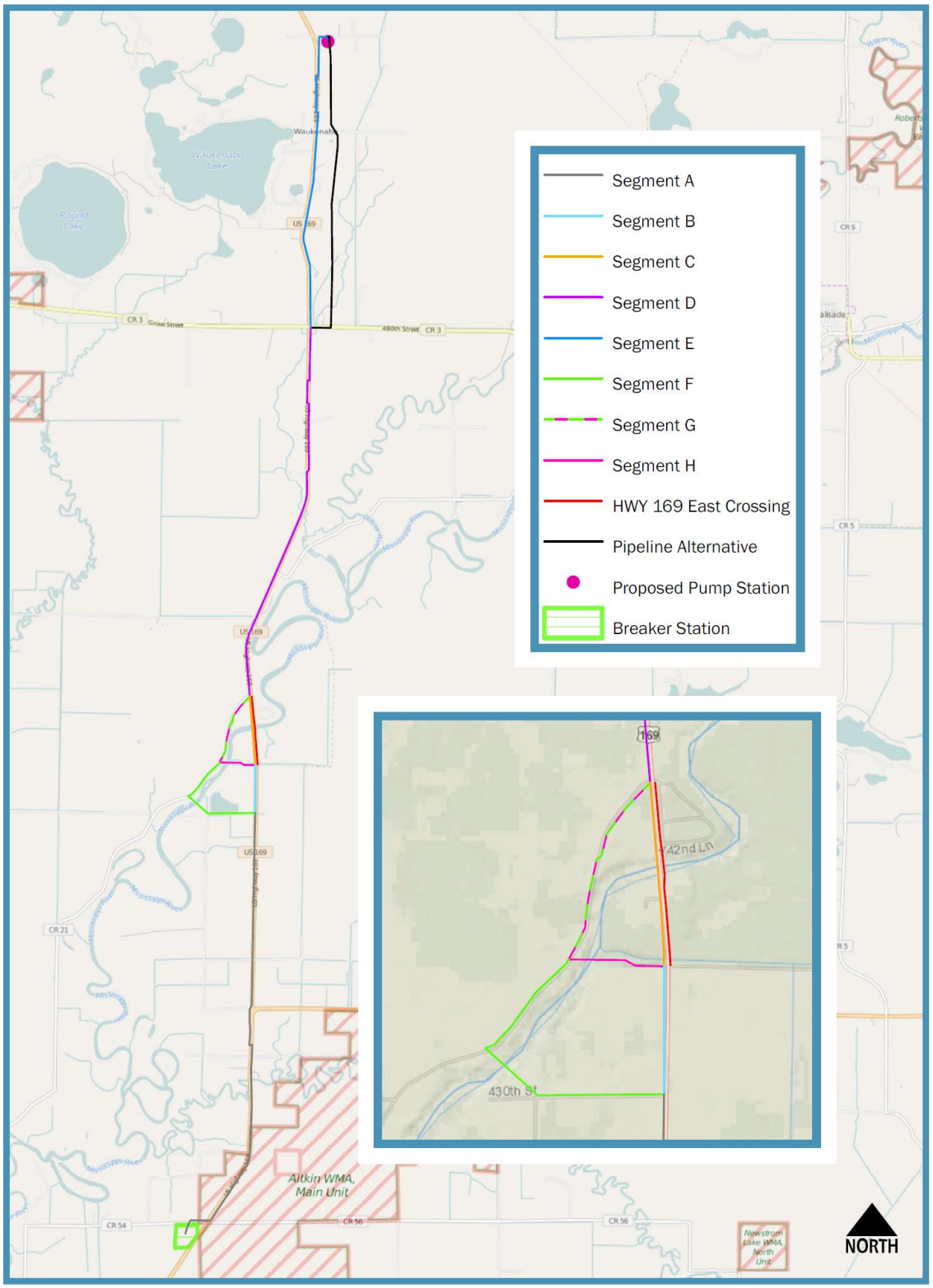


Table 3: Route Segments

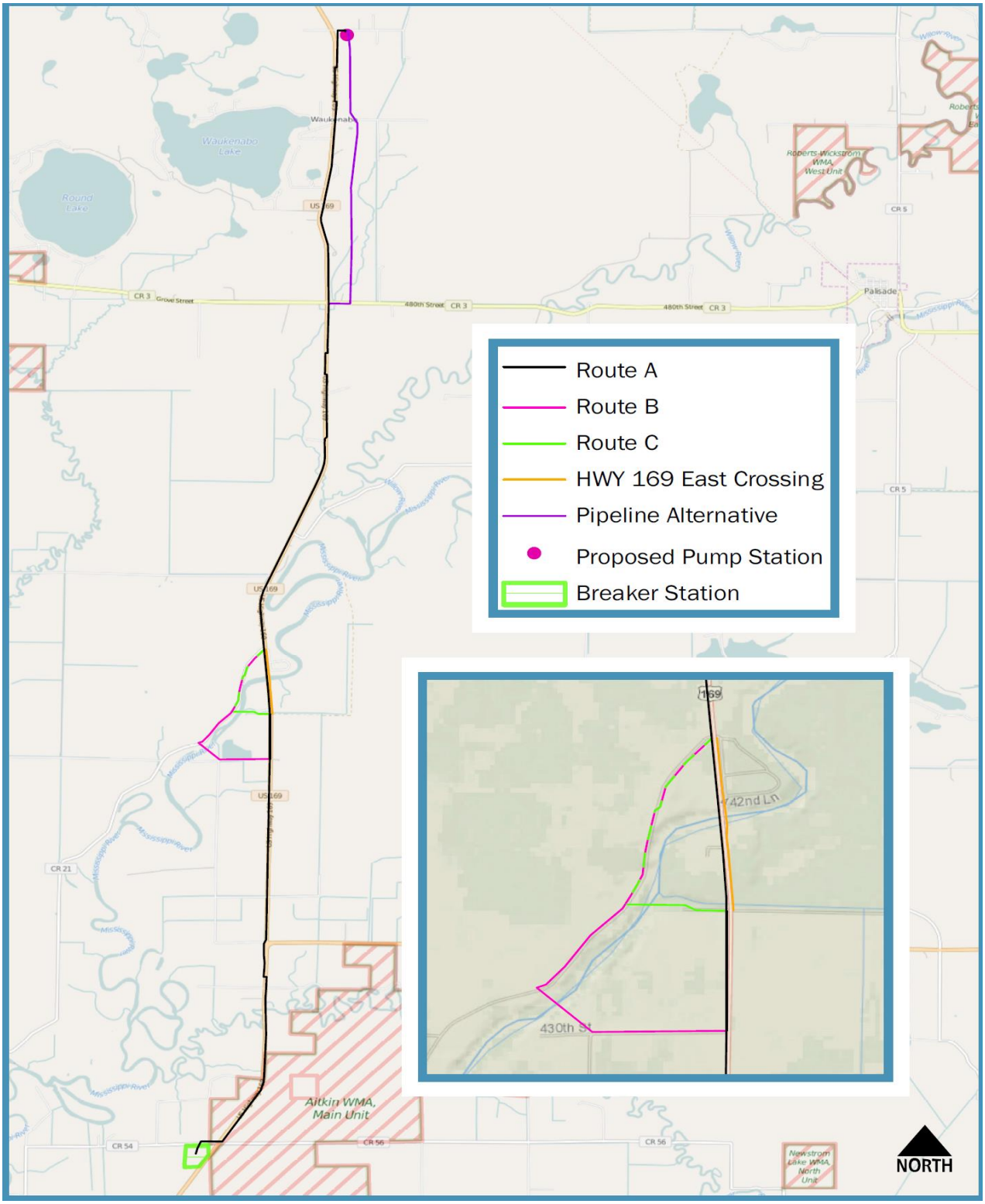
Segment Name	Segment Description	Segment Length (miles)	Origin
A	Highway 169 between Rice River Breaker Station and 430th Street	4.69	Applicant's route
B	Highway 169 - 430th Street – 2,000 feet north of 430th Street. Referred to as "East River Crossing" in application.	0.49	Applicant's route – East River Crossing
C	Highway 169 - 435th Lane to Great River Road/CSAH 21 (includes alternative alignments on both the west and east side of US Highway 169). Referred to as "East River Crossing in application.	0.71	Applicant's route – East River Crossing
D	North along Highway 169 – Great River Road/Aitkin County Highway 21 to Aitkin County Highway 3	3.96	Applicant's route
E	North along Highway 169 –Aitkin County Highway 3 then east on 510th Lane to proposed Palisade Pump Station	3.14	Applicant's route
F	West along 430th Street, across Mississippi River northeast along Great River Road/CSAH 21	1.23	Applicant's route – West River Crossing
G	Northeast along Great River Road/CSAH 21 to US Highway 169. Referred to as "West River Crossing in application.	0.77	Applicant's route – West River Crossing
H	West along the south side of 435th Lane, then cross-country across the river to Great River Road/CSAH 21 to link up with Segment G. Referred to as "Chute Gardens Alternative" in EA Scoping Decision.	0.37	Great River Energy Scoping Comments
I	East along CSAH 3 from US Highway 169,then north cross-country along Enbridge's proposed route to Palisade Pump Station. Referred to as "Pipeline Alternative" in EA Scoping Decision.	3.25	Public Scoping Meeting

4.2 Route Alternatives Evaluated

The route segments described in Section 4.1 could be combined in a variety of ways to produce a route that connects the proposed Rice River Breaker Station and Palisade Pump Station (**Figure 7**). This document evaluates the following route alternatives:

- **Route A**: Follows US Highway 169 between proposed Rice River Breaker Station, turning east along 510th Lane to the proposed Palisade Pump Station. This route is approximately 13 miles in length and combines route segments A, B, C, D, and E. Alternative alignments on either side of US Highway 169 (along route segment C) are evaluated.

Figure 7: Route Alternatives



- **Route B**: Follows US Highway 169 north from the proposed Rice River Breaker Station turning west on 430th Street, crossing the Mississippi River and then proceeding northeast along Great River Road/CSAH 21 to US Highway 169, turning east along 510th Lane to the proposed Palisade Pump Station. This route is approximately 13.8 miles in length and combines route segment s A, F, G, D, and E.
- **Route C**: Follows US Highway 169 north from the proposed Rice River Breaker Station, turning west on along the south side of 435th Lane, then cross-country across the river to Great River Road/CSAH 21 back to US Highway 169, turning east along 510th Lane to the proposed Palisade Pump Station. This route is approximately 13.4 miles in length and combines route segments A, B, H, G, D, and E.
- **Route A/Pipeline Alternative**: Follows US Highway 169 north from the proposed Rice River Breaker Station, turning east along CSAH 3 and then north cross-country along Enbridge's proposed route to Palisade Pump Station. This route is approximately 13.1 miles in length and combines route segments A, B, C, D, and I.
- **Route B/Pipeline Alternative**: Follows US Highway 169 north from the proposed Rice River Breaker Station turning west on 430th Street, crossing the Mississippi River and then proceeding northeast along Great River Road/CSAH 21 to US Highway 169, turning east along CSAH 3 and then north cross-country along Enbridge's proposed route to Palisade Pump Station. This route is approximately 13.9 miles in length and combines route segments A, F, G, D, and I.
- **Route C/Pipeline Alternative**: Follows US Highway 169 north from the proposed Rice River Breaker Station, turning west on along the south side of 435th Lane, then cross-country across the river to Great River Road/CSAH 21 back to US Highway 169, turning east along CSAH 3 and then north cross-country along Enbridge's proposed route to Palisade Pump Station. This route is approximately 13.5 miles in length and combines route segments A, B, H, G, D, and I.

4.3 Alternative Routes Considered and Rejected

Applicants must disclose any route alternatives that were considered, but ultimately rejected.[78] After considering alternatives transmission sources to power the Palisade Pump Station, Great River Energy determined that the Minnesota Power 115 kV "13 Line" was the only viable and cost-effective option. Following the identification of the "13 Line" as the power source, Great River Energy determined that routing along US Highway 169 would minimize the route distance and maximize the potential to follow existing ROW. Realizing the congested area along the US Highway 169 crossing of the Mississippi River, Great River Energy developed an alternative river crossing away from US Highway 169. Great River Energy states that no other route alternatives beyond those described in the Application were considered and rejected.[79]

[78] Minn. Stat. 216E.04, subd. 5; Minn. R. 7850.3100.
[79] Application, at p. 5-4

5 Potential Impacts of the Proposed Project

The construction of a transmission line involves both short and long-term impacts. Some impacts may be avoidable; some may be unavoidable but can be mitigated; others may be unavoidable and unable to be mitigated. In general, impacts can be avoided and mitigated by prudent routing – i.e., by placing the transmission line away from human and environmental resources to the extent possible – and by design and construction measures that minimize potential impacts.

Short-term impacts of the Proposed Project are anticipated to be similar to those of a construction project – noise, dust, soil disturbance and compaction, clearing of vegetation. The Proposed Project would require the use of equipment to clear land, place structures, and string conductors. The impacts of this equipment use are anticipated to be fairly independent of the route selected for the project. They would occur wherever the Proposed Project is located; thus, they are not mitigated by prudent routing. However, these impacts can be mitigated by construction measures, for example using best management practices to control soil erosion and minimizing the removal of vegetation.

Long-term impacts can exist for the life of the Proposed Project and may include aesthetic impacts, health impacts, economic impacts, land use restrictions and impacts to vegetation and wildlife. Long-term impacts are generally not well mitigated by construction measures – these impacts do not flow from how the project is constructed but rather where it is placed and its operational characteristics over time. Long-term impacts can be mitigated by prudent routing and design measures. Thus, long-term impacts can be avoided or mitigated, to a greater or lesser extent, based on the route, alignment, and pole placements for the project.

This section discusses the resources, potential impacts, and mitigation measures associated with the route alternatives identified in Section 4.2. A comparison of the relative merits of the route alternatives is presented in Section 7.

5.1 Regions of Influence

Potential impacts to human and environmental resources are analyzed in this EA within specific spatial bounds or regions of influence (ROI). The ROI for each resource is the geographic area within which a particular impact may exert some influence. This EA uses the ROI concept as the basis for assessing the potential impacts to each resource as a result of the proposed project. The ROI for the impacts analyzed in this EA are summarized in Table 4.

The ROI for most human and environmental resources is the permanent footprint of the Proposed Project, as represented by the transmission line ROW and the permanent footprint of the proposed Rice River Breaker Station. Resources within the footprint, such as soils and trees, are more likely to be impacted by the construction and operation of the Proposed Project. For example, soils could be compacted; trees may be removed. Other resources

may be impacted at a greater distance from the project. In this EA, the following ROI will be used for these resources:

- **ROW:** A distance of 100 feet (50 feet on either side of the proposed alignment) is used to analyze the impacts of displacement, agriculture, forestry, mining, topography, soils, and vegetation. Although the actual alignment may differ from that proposed by Great River Energy and the ROW may be somewhat smaller or larger in certain areas, use of a standard ROW along the anticipated alignment provides for a consistent assessment of potential impacts.

- **400 feet:** A distance of 200 feet either side of the proposed alignment is used as the ROI is used as the ROI for analyzing potential impacts to aesthetics, noise, property value and electric and magnetic fields impacts. This 400-foot distance is roughly equivalent to the route width requested for the majority of the Proposed Project.

- **One Mile:** A distance of one mile from the Project is used as the ROI for analyzing potential impacts to surface water resources, wildlife, archaeological and historic resources, and rare and unique species. Direct impacts, if they occur, are anticipated to diminish relatively quickly such that the potential impacts outside the site would be minimal to moderate. However, indirect impacts may extend beyond the site. For example, indirect impacts to rare and unique species may extend beyond the Project footprint, particularly for wildlife species. Wildlife may move throughout the Project Area and may be impacted by limitations on their movement and their ability to access cover, food, and water.

- **Aitkin County:** Aitkin County will be used as the ROI for analyzing potential impacts to cultural values, socioeconomics, public utilities, airports, agriculture, air quality, and emergency services. These are resources for which impacts may extend throughout communities in the project area.

Table 4: Regions of Influence for Human and Environmental Resources

Type of Resource	Specific Resource / Potential Impact to Resource	Region of Influence
Human Settlement	Displacement,	ROW
	Aesthetics, Electronic Interference, Noise, Property Values, Zoning and Land Use Compatibility,	400 feet
	Public Utilities, Emergency Services, Roads	One Mile
	Socioeconomics, Cultural Values, Airports	Aitkin County
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Induced Voltage	400 feet
Land-based Economies	Agriculture, Forestry, Mining	ROW
	Tourism and Recreation	One Mile
Archaeological and Historic Resources	—	One Mile
Natural Environment	Surface Waters, Ground Water, Wetlands, Vegetation, Soils, Wildlife	ROW[80]
	Air	Atikin County
Rare and Unique Resources	—	One Mile

5.2 Environmental Setting

The proposed project is generally located entirely in Aitkin County in the vicinity of US Highway 169. The proposed project's southern terminus is approximately 3.5 miles northeast of the city of Aitkin, Minnesota, and its northern terminus is approximately 4.5 miles northwest of the city of Palisade (**Figure 1**).

The Proposed Project is located in the Tamarack Lowlands subsection of the Northern Minnesota Drift and Lake Plains Section of the Laurentian Mixed Forest Province. This subsection is characterized by level to gently rolling topography."[81] Significant peat soils are present throughout this subsection, with alluvial soils present along the major rivers.

[80] Avian species can move easily throughout the project area and are susceptible to collision with transmission line conductors. Consequently, impact to avian species will be considered and discussed with a ROI larger than the ROW.

[81] DNR. *Ecological Classification System: Tamarack Lowlands Subsection.* http://www.dnr.state.mn.us/ecs/212Nd/index.html.

Prior to European settlement, vegetation in the area was dominated by lowland birch and aspen-birch. Currently land uses along the Proposed Project are agriculture, recreation, and forest management.[82] The many open areas along the routes evaluated are comprised of forested area, cultivated and grazing land, wetlands, and shrub land.[83]

The National Land Cover Database (NLCD) provides "spatial reference and descriptive data for characteristics of the land surface" nation-wide.[84] Land cover types along the routes evaluated are dominated by a category called "Developed, Open Space," which coincides with the roadways that mark the landscape. Depending upon the route, approximately 7 to 19 percent of the land cover within the ROW is characterized by wetlands and 7 to 10 percent of the ROW is forested. Agriculture accounts for 3 to 8 percent of land cover types (Table 5).

The only HVTL in the vicinity of the Proposed Project is the Minnesota Power "13 Line." A network of distribution lines, generally following roadways, is also present throughout the landscape.

82 Minnesota Department of Natural Resources, Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife: Tamarack Lowlands Subsection Profile. (January 2006),

83 Minnesota Department of Natural Resources (January 2006), page 175.

84 U.S. Geological Survey (February 2012) *The National Land Cover Database*, Retrieved December 21, 2015, from: http://pubs.usgs.gov/fs/2012/3020/fs2012-3020.pdf.

Table 5: Land Cover by Route Alternative

Category		Route A		Route B		Route C		Route A/ Pipeline		Route B/ Pipeline		Route C/ Pipeline	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Open Water		0.25	0%	0.58	0%	0.67	0%	0.25	0%	0.58	0%	0.67	0%
Developed (all types)		151.86	83%	146.98	78%	146.86	79%	115.87	65%	110.99	60%	110.86	61%
	Open Space	99.45	54%	103.65	55%	100.53	54%	74.74	42%	78.94	43%	75.81	42%
	Other	26.20	14%	21.67	11%	23.16	12%	20.56	11%	16.03	9%	17.53	10%
Forested – (all types)		5.95	3%	5.361	3%	8.59	5%	11.07	6%	10.48	6%	13.71	8%
	Deciduous	4.84	3%	4.258	2%	7.49	4%	10.63	6%	10.05	5%	13.28	7%
	Evergreen	0.19	0%	0.185	0%	0.19	0%	0.19	0%	0.19	0%	0.19	0%
	Mixed Forest	0.92	0%	0.917	0%	0.92	0%	0.25	0%	0.25	0%	0.25	0%
	Shrub/Scrub	0.00	0%	0	0%	0.00	0%	0.00	0%	0.00	0%	0.00	0%
Grassland Herbaceous		0.04	0%	0	0%	0.00	0%	0.04	0%	0.00	0%	0.00	0%
Agricultural (all types)		12.08	7%	20.55	11%	15.73	8%	19.70	11%	28.17	15%	23.34	13%
	Pasture/Hay	10.39	6%	17.91	9%	13.32	7%	18.00	10%	25.52	14%	20.93	12%
	Cultivated Crops	1.70	1%	2.645	1%	2.41	1%	1.70	1%	2.65	1%	2.41	1%
Wetlands (All types)		13.34	7%	15.21	8%	13.92	7%	32.38	18%	34.26	19%	32.96	18%
	Woody	10.52	6%	12.4	7%	11.10	6%	17.42	10%	19.30	10%	18.00	10%
	Emergent Herbaceous	2.82	2%	2.817	1%	2.82	2%	14.96	8%	14.96	8%	14.96	8%
Total		183.51	100%	188.69	100%	185.76	100%	179.30	100%	184.48	100%	181.55	100%

5.3 Impacts to Human Settlement

Construction and operation of new transmission lines have the potential to impact human settlement. These impacts might be short-term, for example, an influx of construction jobs during construction, or long-term, for example, changes to land use.

5.3.1 Aesthetics

Aesthetic and visual resources include the physical features of a landscape such as land, water, vegetation, animals, and manmade structures. The relative value of these visual resources in a given area depends on what individuals perceive as being beautiful or aesthetically pleasing. Viewers' perceptions are based on their psychological connection to the viewing area and their physical relationship to the view, including distance to physical features, perspective, and duration of the view. Landscapes which are, for the average person, harmonious in form and use are generally perceived as having greater aesthetic value. Infrastructure which is not harmonious with a landscape or negatively impacts existing features of a landscape could negatively affect the aesthetics of an area.

The landscape along the Proposed Project is a mixture of rural residential development, forested land, agriculture, rivers, streams, lakes, and open space. All route alternatives follow US Highway 169 for the majority of their length and cross the Mississippi River, either at an established crossing or by establishing a new crossing.

The Great River Road is a National Scenic Byway along public roads from the Headwaters of the Mississippi River in Itasca State Park and the Gulf of Mexico (**Appendix D, Map D1**, sheets 4 and 5). All route alternatives would follow the Great River Road along US Highway 169 between County State Aid Highway (CSAH) 21 and CSAH 10.

All route alternatives would establish a new crossing of the Mississippi River. Route Alternative A would establish a new crossing outside of MnDOT ROW along US Highway 169, approximately 50 feet from the deck of the existing US Highway 169 Bridge. In the case of Route Alternatives B and C, the new crossing would be in an area without existing infrastructure. Following the river crossing, each route would follow CSAH 21, which is a more rural section of the Great River Road than the portion along US Highway 169.[85]

Potential Impacts

Aesthetic impacts due to the Proposed Project are anticipated to be moderate.

[85] Great River Road Minnesota: http://www.mnmississippiriver.com/crossingsdirections.cfm

The Proposed Project will introduce new visual elements in the form of transmission structures and breaker station to the landscape in the project area. The Proposed Project will also require the clearing of trees within the ROW. These changes will be visible to residents along the transmission line and to those travelling along US Highway 169 and other local roads.

Depending upon the route, there are between 15 and 20 homes within 200 feet of the anticipated alignment (Table 6).

Table 6: Structures in Proximity to Alignment

Structure Type	Distance (feet)	Structure County by Route Alternative[86]					
		Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Homes	0 - 50	1	1	1	1	1	1
	50 - 100	3 (2)	2	2	2 (1)	1	1
	100 - 200	15 (16)	17	16	12 (13)	14	13
	>200, within Route[87]	12	8	9	10	6	7
Other Structures	0 - 50	1	1	1	1	1	1
	50 - 100	0	3	1	0	3	1
	100 - 200	14	14	17	9	8	12
	>200, within Route	17	14	16	11	8	10

All of the routes evaluated follow existing roadway for the majority of their length. By so doing, the Proposed Project places new infrastructure where there is already existing linear infrastructure, in an attempt to minimize the visual disruption from the Proposed Project. Route alternatives B and C would establish a new crossing of the Mississippi River in an area without existing infrastructure and then follow a portion of the Great River Road that has considerably less traffic than US Highway 169.

Mitigation

Aesthetic impacts of the project can be minimized by: (1) utilizing existing transmission line and roadway ROW, i.e., putting like with like, and (2) avoiding residences by placing the alignment of the transmission line away from residences, e.g., moving the line across the road. Great River Energy proposed alignment has attempted to use existing road ROW and

[86] In cases where the structures counts differ between alignments on the east and west side of US Highway 169, counts on the east side of US Highway 169 are presented in parentheses.

[87] Category used to account for structures within requested route in areas where the requested route width is greater than 400 feet.

to avoid homes and landscaped trees by shifting the proposed alignment from one side of the road to the other.[88]

Adverse impacts can be mitigated by ensuring that damage to natural landscapes during construction is minimized, by minimizing vegetation removal and, to the extent that it does not interfere with safe operation of the transmission line, planting lower-growing woody vegetation in a transition area near the edge of the ROW. Aesthetic impacts can also be mitigated by plantings that minimize visual exposure of structures and substation facilities. Great River Energy indicates a willingness to work with landowners to best locate structures and to minimize damage to vegetation and natural landscapes.[89]

Commission route permits require permittees to minimize vegetation removal in constructing the line and to consider landowner input in locating structures (**Appendices B** and **C**). Aesthetic impacts can also be mitigated through inclusion of specific conditions (e.g., compensation or new plantings or landscaping) in individual easement agreements with landowners along the route.

5.3.2 Cultural Values

Cultural values are learned community beliefs and attitudes. These values provide a framework for individual and community thought and action. Cultural values are informed, in part, by ethnic heritage. Residents of Aitkin County self-reported having primarily European ancestry, with German, Norwegian, Swedish and Irish being the most commonly reported ancestries.[90] Cultural values are also informed by work and leisure pursuits, for example, logging and fishing, as well as geographic features, such as the Mississippi River.

Community events, such as the annual fishing opener, River Boat Heritage Days, and Aitkin County Fair appear more tied to geographic features, national holidays, and seasonal and municipal events than to ethnic heritage.[91]

Potential Impacts

The Proposed Project is not anticipated to impact cultural values within Aitkin County. The Proposed Project will not impact the work and leisure pursuits of residents or geographic features in such a way as to impact the underlying culture of the project area.

Mitigation

Impacts to cultural resources are not anticipated; therefore, mitigation is not proposed.

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88 Great River Energy, Response to Question 6, Appendix F

89 Application, Section 7.2.4.

90 U.S. Census Bureau, 2010-2014 American Community Survey 5-year Estimates: DP02 Selected *Social Characteristics in the United States*, http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t# (listing includes ancestry totaling greater than 1,000).

91 Explore MN, http://www.exploreminnesota.com/things-to-do/2515/aitkin-area-chamber-of-commerce, Aitkin Area Chamber of Commerce. http://aitkin.com/calendar, retrieved February 23, 2016.

5.3.3 Displacement

In the context of transmission line routing proceeding, displacement refers to the removal of a residence or building to facilitate the safe operation of a transmission line. The National Electric Safety Code (NESC) and Great River Energy standards require certain minimum clearances between transmission lines and objects such as trees, buildings, or other structures to ensure that the transmission line can be operated safely. For electrical safety code and maintenance reasons, utilities generally do not allow residences or other buildings within the ROW of a transmission line. Any residences or other buildings located within a proposed ROW are generally removed, or "displaced."

Consistent with its standard for 115 kV transmission lines, Great River Energy proposes to acquire a permanent ROW of 100 feet (50 feet either side of the center line) for most portions of the proposed project. In some areas a slightly wider ROW may be acquired to accommodate guyed structures. In select very constrained areas (e.g. where a building is located close to a roadway ROW), Great River Energy may design the Proposed Project to fit within a 35 ROW on one or both sides of the transmission centerline, for a total ROW width of 70 to 85 feet.[92]

Potential Impacts

A review of aerial imagery indicates that one home and one additional structure are within the anticipated ROW (**Table 6**). These structures are in Route Segment A, near the point where Highway 210 and US Highway 169 split, which is common to all of the route alternatives evaluated.

Mitigation

Displacement of existing homes and other structures can often be avoided through design refinements to the project. These refinements could include modifications to the transmission line alignment or design modifications (e.g. changes in structure design) that would allow for a narrower easement.

Great River Energy would not permit any homes to remain within the easement ROW and has expressed confidence that engineering modifications or a reduction in easement width could be employed to avoid displacement of any homes.[93]

5.3.4 Electronic Interference

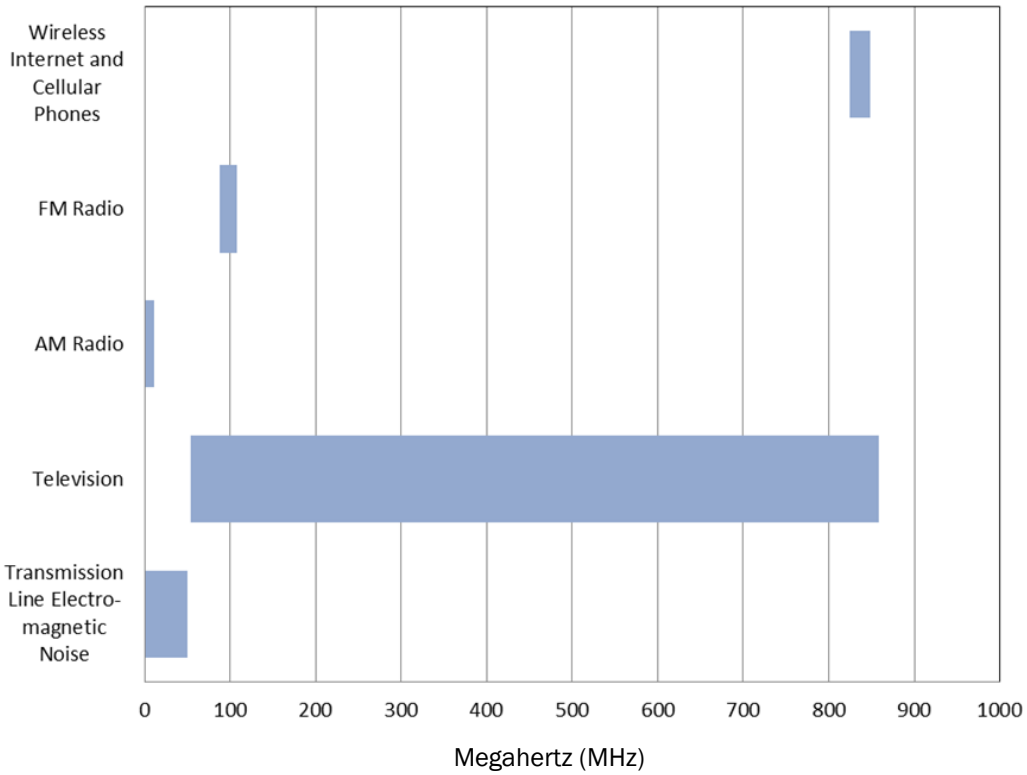
Transmission lines have the potential to interfere with the normal operation of electronic devices. Interference can result from electromagnetic noise created by the ionization of air molecules surrounding conductors. This ionization is commonly known as corona. Interference can also result from transmission line poles which block line-of-sight communications.

92 Application, at p. 4-4
93 Great River Energy Response to Question 5, **Appendix F**

Potential Impacts

No impacts to electronic devices are anticipated as a result of the Proposed Project. Interference due to electromagnetic noise is not anticipated. Interference due to line-of-sight obstruction is not anticipated and can be mitigated. In situations where a transmission line does cause electronic interference, Commission route permits require permittees to take those actions which are feasible to restore or provide reception equivalent to reception levels before construction of the line (**Appendices B** and **C**).

Figure 8: Frequencies of Electronic Communications and Transmission Line Electromagnetic Noise



Radio Interference

Corona from transmission line conductors can generate electromagnetic noise in the radio frequency range (**Figure 8**). This noise may cause interference with radio communications. Amplitude modulation (AM) radio interference typically occurs immediately under a transmission line and dissipates rapidly on either side. If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations can be restored by appropriate modification of the receiving antenna system.[95]

[94] High Voltage and Electrical Insulation Engineering, Arora and Mosch, 2011; How the Radio Spectrum Works, http://www.howstuffworks.com/radio-spectrum1.htm.

[95] Id.

Frequent modulation (FM) radio receivers usually do not pick up interference from transmission lines because corona-generated radio frequency noise decreases in magnitude with increasing frequency and is quite small in the FM broadcast band (**Figure 8**). Additionally, the interference rejection properties inherent in FM radio systems make them virtually immune to electromagnetic noise.[96]

Two-way radios used for emergency services typically operate at frequencies greater than 150 MHz.[97] Minnesota is currently moving to a statewide emergency communications system that operates at 800 MHz.[98] Corona-generated electromagnetic noise is minimal at these frequencies (**Figure 8**).

Television Signals

It is possible to receive television broadcasts through a digital antenna, satellite dish, or a local cable provider. How an individual receives their television broadcast dictates the potential interference that might occur from a transmission line.

"Broadcast television stations in the United States have switched from analog to digital transmissions," and to receive these transmission an antenna must be able to receive VHF or ultra-high frequency (UHF) signals.[99] These frequencies are higher than frequencies generated by corona noise. Additionally, digital broadcasts use packets of binary information as opposed to waveforms to transfer content. These binary signals are less susceptible to corruption and can be corrected for errors. Digital broadcasts are susceptible to freezing and pixilation due to multipath reflections or low signal strength.

Satellite television is broadcast at radio frequencies in the 12 to 18 gigahertz range.[100] These signals are also higher than corona generated noise. Satellite television is susceptible to line-of-sight interference, for example, rain or snow can result in the loss of signal. If the obstruction is removed, the signal interference will be removed also.

Cable broadcasts are redistributed satellite broadcasts and are generally not susceptible to interference due to the use of shielded coaxial cable.

Impacts to television broadcasts from the Proposed Project are anticipated to be minimal. Transmission frequencies are higher than those of corona-generated noise, which makes interference unlikely. Multipath reflections due to the wooden structures of the Proposed Project are unlikely. Line-of-site obstructions could occur if a transmission structure was directly in the path of a transmission signal (e.g. satellite signal).

96 Id.
97 Emergency Medical Services Regulatory Board, EMS Radio Project, http://www.emsrb.state.mn.us/comm.asp.
98 Id.
99 U.S. Federal Communications Commission (n.d.) *Antennas and Digital Television*: https://www.fcc.gov/consumers/guides/antennas-and-digital-television.
100 National Telecommunications and Information Administration (August 2011).

Wireless Internet and Cellular Phones

Wireless internet and cellular phones use frequencies in the UHF range, and vary based on phone service provider. UHF signals begin at 900 MHz, and are higher than frequencies generated by corona noise.

Mitigation

Any impacts to AM radio reception can be mitigated by distance and antenna modifications.

Use of different antennas or satellite dishes, or adjusting their locations, will typically resolve any impacts to television signals that may be impacted.

Impacts to wireless internet and cellular phones are not anticipates and mitigation is not proposed.

Commission permits require permittees to mitigate impacts communications devices and to restore reception to pre-project quality (**Appendices B** and **C**).

5.3.5 Land Use and Zoning

Land use is the use of land by humans, such as residential, commercial or agricultural uses, and often refers to zoning. Zoning is a regulatory tool used by local governments (cities, counties, and some townships) to promote or restrict certain land uses within specific geographic areas. HVTLs have the potential to impede current and future land use.

A route permit from the Commission supersedes local zoning, building or land use rules, regulations or ordinances.[101] However, the Commission's route permit decision must be guided, in part, by potential impacts to local zoning and land use in order to fulfill the legislative goal of "minimizing human settlement and other land use conflicts.[102]

Land use along the Proposed Project is a mixture of forestry, agriculture, and residential land uses. The majority of the land along all routes evaluated is privately owned, but a portion common to all routes (Route Segment A) crosses portions of the Aitkin Wildlife Management Area (WMA) and the Waukenabo State forest adjacent to US Highway 169. Residences and farmsteads exist along the route segments. The Proposed Project also crosses several water bodies.

Aitkin County administers the zoning code along the Proposed Project.[103] All routes evaluated cross portions of Aitkin County's Farm Residential, Open and Natural Environment zoning districts. All route alternatives also cross portions of Aitkin County's Shoreland zoning district. Aitkin County Shoreland Ordinance is intended to balance development in designated shoreland areas with protection of natural resources.[104] The Proposed Project

[101] Minn. Stat. 216E.10, subd. 1.
[102] Minn. Stat. 216E.03, subd. 7.
[103] Aitkin County Zoning Ordinance (amended April 9, 2013), https://www.co.aitkin.mn.us/ordinances/GenZoningOrd_2013.pdf .
[104] Aitkin County Shoreland Ordinance, (amended May 8, 2012), https://www.co.aitkin.mn.us/ordinances/shoreland2012amended.pdf .

would be classified as an "Essential Services" under the Aitkin County Zoning Ordinance. Essential services are permitted uses in all zoning classifications.

Potential Impacts

The existence of a transmission line easement restricts certain uses of a property. Most commonly, existing structures and trees typically need to be cleared within the ROW. Easement agreements typically preclude the erection of structures, would preclude the planting of trees or other tall vegetation that might grow into the transmission line or erecting permanent structures; however, planting agricultural crops or using the ROW for pasture land is not generally precluded.

Direct impacts to land use and zoning due to the Proposed Project are anticipated to be minimal. While the impact will be long-term, it is of a relative small size, and parallels existing electric roadway for the majority of its length. The proposed project will not significantly obstruct or alter current farming practices in the proposed ROW. Removal of trees from the ROW will preclude future timber harvest; however, this impact will be limited to approximately 5.4 to 13.7 acres depending upon the route.

Mitigation

Impacts from the Proposed Project to current and future land uses are expected to be minimal. These impacts can be mitigated by selecting routes and alignments that are compatible, to the extent possible, with current and future land use and zoning. Encumbrances to individual parcels can be mitigated through negotiated easement agreements. These agreements are not within the scope of this EA.

5.3.6 Noise

Noise can be defined as any undesired sound.[105] It is measured in units of decibels on a logarithmic scale. The A-weighted scale (dBa) is used to duplicate the sensitivity of the human ear.[106] A three dBa change in sound is barely detectable to average human hearing, whereas a five dBa change is clearly noticeable. A 10 dBa change is perceived as a sound doubling in loudness.

Minnesota's noise standards differ based on noise area classifications (NAC), which correspond to the location of the listener (or receptor) and the time of day (**Table 7**).[107] Although the NACs are based on the land use activity (e.g. residential, educational, manufacturing) of the location where the noise is heard, the NACs do not always reflect the zoning of the location. Noise standards are expressed as a range of permissible dBa over a one-hour time period. L_{10} may be exceeded 10 percent of the time, or six minutes, while L_{50}

[105] MPCA (n.d.) *Noise Program*: https://www.pca.state.mn.us/air/noise-program.
[106] MPCA (November 2015) *A Guide to Noise Control in Minnesota*: https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf.
[107] Minn. R, 7030.0050, https://www.revisor.leg.state.mn.us/rules/?id=7030.0050

may be exceeded 50 percent of the time, or 30 minutes. Standards vary between day and nighttime hours.[108]

Table 7: Noise Area Classifications (dBa)[109]

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

The Proposed Project is in a rural area. Ambient noise levels in these types of locations are generally between 30 and 40 dBa during daytime hours, with higher ambient noise levels of 50 to 60 dBA expected near roadways.[110]

The primary noise receptors within the route would be residences and users of recreational facilities in proximity to the Proposed Project.

Potential Impacts

Potential noise impacts from the Proposed Project can be grouped into two categories: (1) noise from construction of Proposed Project, and (2) noise from operation of the Proposed Project. Noise impacts for both categories are anticipated to be minimal.

Construction

Construction noise is not anticipated to exceed state noise standards; however, this does not mean that direct noise impacts will not occur from construction related activities. These minimal impacts will be short-term and sporadic.

Noise from heavy equipment and increased vehicle traffic will occur during daytime hours. These impacts are anticipated to be short-term and intermittent. Noise associated with heavy equipment can range between 80 and 90 dBa at full power 50 feet away from the source. Heavy equipment generally runs at full power up to 50 percent of the time.[111] Point source sounds decrease six dBa at each doubling of distance.[112] This means an 80 dBa sound at 50 feet is perceived as a 50 dBa sound at 1,600 feet. Any exceedance of noise standards would be short-term and confined to daytime hours.

Great River Energy anticipates that noise from construction activities will occur during daytime hours.[113]

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108 Minnesota Pollution Control Agency (November 2015), page 2.
109 Minn. R. 7030.0040
110 Application, at p. 7-7.
111 Federal Highway Administration (November 30, 2015) *Highway Traffic Noise: Construction Noise Handbook*, Retrieved March 22, 2016, from: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm.
112 Minnesota Pollution Control Agency (2015), page 10.
113 Application, Section 7.2.3

Operation

Noise from transmission lines is due to small electrical discharges at specific locations along the surface of the conductor that ionize surrounding air molecules. This phenomenon—common to all transmission lines—is known as corona. In general, any imperfection on the surface of the conductor might be a source for corona. Examples include: dust and dirt, or nicks and burrs from construction. Resulting noise levels are dependent upon voltage level (corona noise increases as voltage increases) and weather conditions.

In foggy, damp or rainy conditions, corona noise, a subtle crackling sound, caused by water droplets striking a transmission line is common. In light rain, dense fog, snow or other relative moist conditions, corona noise might be higher than rural background levels. In heavy rain, corona noise increases, but because of the increased background noise associated with heavy rain, the corona noise is undetectable. During dry weather, corona noise is imperceptible.

Noise from Enbridge's proposed pump station is discussed in Section 5.8.

Great River Energy modeled estimated corona noise for the proposed project using the Bonneville Power Administration Corona and Field Effects Program. The model indicated that, during heavy rains, corona noise will be 17.7 dBa at the edge of the ROW and 18.8 dBa directly underneath the proposed transmission line (**Table 8**). These noise levels are below ambient noise levels in the project area.

Table 8: Estimated Corona Effect Noise[114]

Location	Noise Level in A-weighted Decibels (dBa)	
	L_5	L_{50}
Right-of-Way Edge	17.7	14.2
Directly Underneath the Proposed Transmission Line	18.8	15.3

Opening and closing of the breakers at the Rice River Breaker Station will generate noise. The opening and closing occurs very infrequently during line maintenance or in the event of an accident that would trip the breakers to ensure safety of the line.[115]

Mitigation

Heavy equipment will be equipped with noise attenuation equipment such as mufflers.[116]

No noise impacts are anticipated during operation of the proposed project; therefore, no mitigation is proposed.

[114] Application, Section 7.2.3
[115] Id.
[116] Id.

Commission permits require permittees to comply with applicable noise standards (**Appendices B** and **C**).

5.3.7 Property Values

The placement of infrastructure near human settlements has the potential to impact property values. The impacts can be positive and negative. The type and extent of impacts depends on the relative location of the infrastructure and existing land uses in the project area. For example, a new highway may increase the value of properties anticipated to be used for commercial purposes, but decrease the value of nearby residential properties.

Potential impacts to property values due to transmission lines are related to three main concerns: (1) potential aesthetic impacts of the line, (2) concern over potential health effects from electric and magnetic fields (EMF), and (3) potential interference with agriculture or other land uses. Research on the relationship between property values and proximity to transmission lines has not identified a clear cause and effect relationship. Rather, the presence of a transmission line is one of many factors that affect the value of a specific property. The research has revealed trends which are generally applicable to properties near transmission lines:[117]

- When negative impacts on property values occur, the potential reduction in property values is in the range of 1 to 10 per cent.
- Impacts on property values decrease with distance from the line. Thus, impacts on the sale price of smaller properties are usually greater than impacts on the sale price of larger properties.
- Other amenities, such as proximity to schools or jobs, lot size, square footage of a house, and neighborhood characteristics, tend to have a much greater effect on sale price than the presence of a power line.
- Negative impacts appear to diminish over time.
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farming operations.

A recent literature review examined 17 studies on the relationship between transmission lines and property values.[118] The reviewers concluded that the studies indicate small or no effects on the sale price of properties due to the presence of transmission lines.[119]

Potential Impacts

Direct impacts to property values from the Proposed Project are anticipated to be minimal. While impacts to property values could occur, any potential impact would be difficult to attribute to the proposed project specifically. For most of its length, the Proposed Project

[117] Final Environmental Impact Statement, Arrowhead–Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, p. 212-215.
[118] The Effects of Transmission Lines on Property Values: A Literature Review, Journal of Real Estate Literature, 2010, www.real-analytics.com/Transmission Lines Lit Review.pdf.
[119] Id.

would follow existing US Highway 169 ROW. As proximity to major roadways would be one factor of many affecting the value of an individual property, any impact from the transmission line would be incremental. The Proposed Project would not significantly reduce future agricultural uses and aesthetic impacts from the transmission line would be incremental to the aesthetic impact of the highway.

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts, perceived health risks, and encumbrances to future land use. Property values can also be mitigated through inclusion of specific conditions in individual easement agreements with landowners along the proposed route.

5.3.8 Socioeconomics

The proposed project is located in a rural part of the state, away from major population centers. U.S. Census data was used to develop **Table 9**, which provides information regarding total population and household income, and percentage minority population and individuals below the poverty level. The median household income in the project area is lower than Minnesota as a whole. Correspondingly, the percentage of individuals living below the poverty level is somewhat higher than the state as a whole. Minority groups make up a small percentage of the total population.

Aitkin County's largest industries are tourism, forestry and agriculture, with a growing manufacturing sector, particularly in metal fabrication"[120]

Table 9: Population Characteristics[121]

Location	Population		Percentage		Median Household Income***
	2010 Census	2014 Estimate*	White Alone**	Individuals Below Poverty Level	
Minnesota	5,303,925	5,457,173	85.7	11.5	$59,836
Aitkin County	16, 202	15,964	94.9	12.1	$41,617
Aitkin	2,165	2,079	95.5	21.3	$30,491
Spencer Township	518	554	95.8	9.2	$61,250
Morrison Township	200	253	99.5	11.1	$45,179
Waukenabo Township	316	298	94	11.4	$44,219

*2014 American Community Survey 5-year population estimate

** Percent White Alone is self-reported by Census responders and does not include those identifying themselves as Hispanic or Latino.

*** 2014 American Community Survey 5-year Estimates.

[120] Aitkin County Department of Economic Development Website: https://www.co.aitkin.mn.us/departments/economic-dev/economic-develop.html .

[121] U.S. Census. *American FactFinder:* http://factfinder2.census.gov .

While Aitkin County has a slightly higher percentage of residents living below poverty level than Minnesota generally, the townships along the Proposed Project have slightly fewer residents living below the poverty level.

Potential Impacts

Great River Energy anticipates a temporary construction force of 15-20 over the 8-month course of construction[122]. It is unknown if any of these jobs will be local jobs. Operation of the Proposed Project will not create any permanent jobs. Communities and businesses near the project can expect a short-term increase in revenues due to project construction, and construction will not disrupt these communities and businesses.

The Proposed Project will generate a minimal positive direct economic impact due to expenditures at local businesses during project construction from purchases of goods and services.[123]

Anticipated direct negative impacts are also minimal. The Proposed Project will not disrupt local businesses and does not disproportionately impact low-income or minority populations.

Mitigation

Adverse impacts are not expected; therefore, mitigation is not proposed.

5.4 Human Health and Safety

Construction and operation of new transmission lines have the potential to impact human health and safety.

5.4.1 Electric and Magnetic Fields

Electric and magnetic fields (EMF) are invisible forces that result from the presence of electricity. EMF occurs naturally and is caused by weather or the geomagnetic field. Man-made EMF is caused by all electrical devices and is found wherever people use electricity.

EMF are characterized and distinguished by their frequency, that is, the rate at which the field changes direction each second. Electrical lines in the United States have a frequency of 60 cycles per second or 60 Hertz (Hz). EMF at this frequency level is known as extremely low frequency EMF (ELF-EMF).

Electric fields are created by the electric charge (i.e. voltage) on a conductor. The strength of the electric field produced is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/m), not the current (amps). The strength of an electric field decreases rapidly as it travels from the conductor, and is easily shielded or weakened by most objects and materials, such as trees and buildings.

[122] Application, at p. 4-10
[123] Application, at p. 4-10

Magnetic fields are created by the electrical current (i.e. amps) moving through a conductor. The strength of a magnetic field produced is proportional to the electrical current moving through the transmission line and is measured in milliGauss (mG). Similar to electric fields, the strength of a magnetic field decreases rapidly as the distance from the source increases. However, unlike electric fields, magnetic fields are not easily shielded or weakened by objects or materials. **Table 10** provides examples of magnetic fields associated with common electric household appliances.

Table 10: Magnetic Fields of Common Electric Appliances (mG)[124]

Appliance	Distance from Source (feet)		
	0.5	One	Two
Can Opener	600	150	20
Computer	14	5	2
Copy Machine	90	20	7
Shaver	100	20	-
Stove	30	8	2
Hair Dryer	300	10	-
Portable Heater	100	20	4
Vacuum Cleaner	300	60	10

Health Studies

A concern related to EMF is the potential for adverse health effects due to EMF exposure. In the 1970s, epidemiological studies indicated a possible association between childhood leukemia and EMF levels. Since then, various types of research have been conducted to examine EMF and potential health effects including animal studies, epidemiological studies, clinical studies, and cellular studies. Scientific panels and commissions have reviewed and studied this research data. These studies have been conducted by, among others, the National Institute of Environmental Health Sciences,[125] the World Health Organization,[126] the Scientific Committee on Emerging and Newly Identified Health Risks,[127] and the Minnesota State Interagency Working Group on EMF Issues.[128] In general, these studies concur that:

- Based on epidemiological studies, there is an association between childhood leukemia and EMF exposure. There is no consistent association between EMF exposure and other diseases in children or adults.
- Laboratory, animal, and cellular studies fail to show a cause and effect relationship between disease and EMF exposure at common EMF levels. A biological mechanism for how EMF might cause disease has not been established.

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124 United States Environmental Protection Agency (1992) *EMF in Your Environment:* http://nepis.epa.gov

125 National Institute of Environmental Health Sciences, Electric and Magnetic Fields, http://www.niehs.nih.gov/health/topics/agents/emf/.

126 World Health Organization, Electromagnetic Fields, http://www.who.int/peh-emf/en/.

127 Scientific Committee on Emerging and Newly Identified Health Risks, http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_022.pdf.

128 A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options, Minnesota State Interagency Working Group on EMF Issues, http://energyfacilities.puc.state.mn.us/documents/EMF White Paper - MN Workgroup Sep 2002.pdf [hereinafter MSIWG White Paper on EMF Issues].

- Because a cause and effect relationship cannot be established, while an association between childhood leukemia and EMF exposure has been shown, there is:
    - Uncertainty as to the potential health effects of EMF,
    - No methodology for estimating health effects based on EMF exposure,
    - A need for further study of the potential health effects of EMF,
    - A need for a prudent avoidance approach in the design and use of all electrical devices, including transmission lines.

Regulations and Guidelines

Currently, there are no federal regulations regarding allowable electric or magnetic fields produced by transmission lines in the United States; however, state governments have developed state-specific regulations (**Table 11**). Additionally, international organizations have adopted standards for exposure to electric and magnetic fields (**Table 12**).

Table 11: State Electric and Magnetic Field Standards[129]

State	Electric Field (kV/m)		Magnetic Field (mg)
	Within Right-of-Way	Edge of Right-of-Way	Edge of Right-of-Way
Florida	8.0[a]	2.0	150[a] (max load)
	10.0[b]	—	200[b] (max load)
	—	—	250[c] (max load)
Massachusetts	—	—	85g
Montana	7.0[d]	1.0[e]	—
New Jersey	—	3.0	—
New York	11.8	1.6	200
	11.0[f]	—	—
	7.0[d]	—	—
Oregon	9.0	—	—

a 69 kV to 230 kV transmission lines
b 500 kV transmission lines
c 500 kV transmission lines on certain existing Rights-of-Way
d Maximum for highway crossing
e May be waived by landowner
f Maximum for private road crossings
g A level above 85 mG is not prohibited, buy may trigger a more extensive review of alternatives

.

[129] National Institute of Environmental Health Sciences (2002)

Table 12: International Electric and Magnetic Field Guidelines

Organization	Electric Field (kV/m)		Magnetic Field (mG)	
	General Public	Occupational	General Public	Occupational
Institute of Electrical and Electronics Engineers	5.0	20	9,040	27,100
International Commission on Non-Ionizing Radiation Protection	4.2	8.3	2,000	4,200
American Conference of Industrial Hygienists	—	25	—	10,000/ 1,000[a]
National Radiological Protection Board	4.2	—	830	4,200
a For persons with cardiac pacemakers or other medical electronic devices				

The Minnesota Public Utilities Commission limits the maximum electric field under all transmission lines in Minnesota to 8.0 kV/m. A standard for magnetic fields has not been adopted. However, the Commission has adopted a prudent avoidance approach in routing transmission lines and, on a case-by-case basis, considers and may require (through permits) mitigation strategies for minimizing EMF exposure levels associated with transmission lines (see discussion of mitigation strategies, below).

Potential Impacts

No adverse health impacts from electric or magnetic fields are expected for persons living or working near the Proposed Project. Great River Energy has modeled and calculated the electric and magnetic fields associated with the proposed project. The calculated maximum electric field directly under the transmission line range from 1.38 to 1.76 kV/m and 0.21 kV/m to 0.54 kV/m at the edges of the ROW (**Table 13**).[130] These values are less than the Commission standard of 8.0 kV/m.

Table 13: Calculated Electric Fields (kV/m) One Meter Above Ground[131]

Scenario	Maximum Operating Voltage (kV)	Distance to Proposed Centerline in Feet								
		-200	-100	-50	-25	0	25	50	100	200
115 kV Single Circuit (horizontal or braced post)	121	0.02	0.06	0.21	0.48	1.38	0.65	0.19	0.06	0.02
115 kV Single Circuit with 12.5 kV Distribution Underbuild	121/13.1	0.02	0.07	0.23	0.40	1.76	0.41	0.18	0.07	0.02
115 kV Single Circuit H-Frame	121	0.01	0.08	0.54	1.57	0.97	1.57	0.54	0.08	0.01

The calculated maximum magnetic field at peak electrical load is dependent upon line design and varies from 9.9 to 48.72 mG at the transmission line centerline and 2.19 to 7.92 mG at the edge of the ROW (**Table 14**). The variations are attributable to line design;

130 Application, page 6-6.
131 Adapted from Application, Table 6-1

structures carrying both the 115 kV line and distribution lines have higher magnetic fields than structures supporting only the proposed 115 kV line. These values are below state and international standards developed for magnetic fields.

Table 14: Calculated Magnetic Fields One Meter Above Ground (mG)[132]

Scenario	Load	Line Current (Amps)	Distance to Proposed Centerline in Feet								
			-200	-100	-50	-25	Max.	25	50	100	200
115 kV Single Circuit (horizontal or braced post)	Peak	70	0.19	0.69	2.19	4.99	9.90	5.90	2.49	0.75	0.19
	Average	42	0.11	0.41	1.31	2.99	5.94	3.54	1.50	0.45	0.12
115 kV Single Circuit with 12.5 kV Distribution Underbuild	Peak	70/300	0.61	2.31	7.92	21.22	48.72	21.55	8.11	2.35	0.61
	Average	42/180	0.37	1.39	4.75	12.73	29.54	12.93	4.67	1.41	0.37
115 kV Single Circuit H-Frame	Peak	70	0.32	1.25	4.70	12.83	20.53	12.83	4.70	1.25	0.32
	Average	42	0.19	0.75	2.82	7.70	12.30	7.70	2.82	0.75	0.19

Mitigation

The Commission has adopted a prudent avoidance approach in routing transmission lines and, on a case-by-case basis, considers and may require (through permits) mitigation strategies for minimizing EMF exposure levels associated with transmission lines. No health impacts due to EMF are anticipated; therefore, no mitigation is proposed.

5.4.2 Implantable Medical Devices

EMF may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators and insulin pumps. Most of the research on electromagnetic interference and medical devices is related to pacemakers. Laboratory tests indicate that interference from magnetic fields in pacemakers is not observed until 1,000 mG, a field strength greater than that associated with high voltage transmission lines.[133] Therefore, the focus of research has been on electric field impacts.

Electric fields may interfere with a pacemaker's ability to sense normal electrical activity in the heart. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/ defibrillators, indicate that electric fields less than 6 kV/m are unlikely to affect operation of

[132] Adapted from Application, Table 6-3
[133] Electric Power Research Institute (2004) Electromagnetic Interference with Implanted Medical Devices.

modern bipolar devices. Older unipolar designs, however, are more susceptible to interference from electric fields, with research suggesting that interference may occur with electric fields ranging from 1.2 to 1.7 kV/m.[134]

There are no residences, businesses, or sensitive receptors such as hospitals or nursing homes located within the any of the anticipated ROWs evaluated in this document, therefore the regular presence of implantable medical devices within the ROW is not expected.

Potential Impacts

Impacts to implantable medical devices from the proposed project are expected to be minimal. The calculated maximum electric field strength for the project is 1.76 kV/m. This field strength is below the 6.0 kV/m interaction level for modern, bipolar pacemakers, but above the range of interaction for older, unipolar pacemakers. Therefore, impacts to unipolar pacemakers might occur directly underneath the proposed transmission line. Moving away from the transmission line centerline would return the pacemaker to its normal operation. The calculated maximum electric field strength at 25-feet from the proposed centerline and the edge of the ROW is 0.67 kV/m and 0.22 kV/m, respectively. These values are below the range of interference to unipolar pacemakers.

Mitigation

No health impacts due to EMF are anticipated from the Proposed Project; thus, no mitigation measures are proposed. However, consistent with the Commission's prudent avoidance approach to potential EMF impacts, basic mitigation measures are prudent. Electric and magnetic fields diminish with distance from a conductor. Thus, EMF exposure levels can be minimized by routing transmission lines away from residences and other locations where citizens congregate. EMF exposure levels can also be minimized by conductor configurations than facilitate phase cancellation between circuits.[135]

5.4.3 Stray Voltage

In general terms, stray voltage can be defined as "voltage caused by an electric current in the earth, or in ground water, resulting from the grounding of electrical equipment or an electrical distribution system."[136] Stray voltage encompasses two phenomena: neutral-to-earth (NEV) voltage and induced voltage.

Neutral-to-Earth Voltage

NEV is a type of stray voltage that can occur where distribution lines enter structures. "Electrical systems—farm systems and utility distribution systems—are grounded to the earth to ensure safety and reliability.... Inevitably, some current flows through the earth at each

[134] Toivonen, L., J. Valjus, M. Hongisto, and M. Ritta, 1991, The Influence of Elevated 50 Hz Electric and Magnetic Fields on Implanted Cardiac Pacemakers: The Role of the Lead Configuration and Programming of the Sensitivity, Blackwell Publishing Ltd., Helsinki, Finland.

[135] MSIWG White Paper on EMF Issues.

[136] Edison Electric Institute (April 2005) *Glossary of Electric Industry Terms*, Washington, DC: Edison Electric Institute (2005).

point where the electrical system is grounded and a small voltage develops."[137] This extraneous voltage appears on metal surfaces in buildings, barns and other structures.

NEV is typically experienced by livestock that contact one or more metal objects on a farm, for example, feeders, waterers, or stalls. Metal objects on a farm are grounded to earth through electrical connections. Livestock, by virtue of standing on the ground, are also grounded to earth. If an animal touches two points at different voltages (one at neutral voltage and the other near true ground),[138] a small current will flow through the livestock to the ground because the animal completes the electrical circuit.[139]

Despite livestock and metal objects both being grounded to the earth there are a number of factors that affect the effectiveness of the ground, that is, a good or poor ground. In metal objects these include wire size and length, the quality of connections, the number and resistance of ground rods, and the current being grounded.[140] Likewise, a number of factors also determine the extent to which livestock are grounded, for example, if the animal is standing on wet versus dry ground.[141] Stray voltage results from this difference in the effectiveness of grounding and on the resulting electrical currents. It can exist at any farm, house or business that uses electricity, independent of whether a transmission line nearby.

If NEV is prevalent in an agricultural operation it can affect livestock health. This concern has primarily been raised on dairy farms because of its potential to affect milk production and quality. NEV is by and large an issue associated with electrical distribution lines and electrical service at a residence or on a farm. Transmission lines do not create stray voltage as they do not directly connect to businesses, residences, or farms.

Induced Voltage

The electric field from a transmission line can extend to nearby conductive objects, such as a metal fence, and induce a voltage upon them. This phenomenon is dependent on many factors, including the shape, size, orientation, capacitance, and location of the object along the ROW. If the objects upon which a voltage is induced are insulated or semi-insulated from the ground and a person touches them, a small current will pass through their body to the ground, which may be accompanied by a spark discharge and mild shock. This is similar to what can occur when an individual walks across a carpet and touches a grounded object or another person.

The primary concern with induced voltage is not the voltage, but the current that flows through a person to the ground when touching the object. To ensure the safety of persons in the proximity of transmission lines, the NESC requires that any discharge be less than five milliAmperes. In addition, the Commission's electric field limit of 8 kV/m is designed to

[137] Wisconsin Public Service Commission (2011) Answers to Your Stray Voltage Questions: Backed by *Research*: http://www.wisconsinpublicservice.com/business/pdf/farm_voltage.pdf, page 1.
[138] North Dakota State University Agricultural Engineering Department (1986) *Extension Publication #108: Stray Voltage*: https://www.ag.ndsu.edu/extension-aben/epq/files/epq108.pdf.
[139] Michigan Agricultural Electric Council (October 2008) *Stray Voltage: Questions and Answers*: http://maec.msu.edu/Stray%20Voltage%20Brochure%202008.pdf.
[140] North Dakota State University Agricultural Engineering Department (1986).
[141] Id.

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

Transmission lines may cause additional current to flow on distribution lines where these lines parallel. When distribution lines and electrical service are properly wired and grounded, these additional currents are not significant. However, if distribution lines and electrical service are not properly wired and grounded, these additional currents could create stray voltage impacts.

Potential Impacts

Impacts to residences or farming operations resulting from NEV are not anticipated. The proposed project is a 115 kV transmission line that does not directly connect to businesses or residences within the route width, and does not change local electrical service.

Impacts due to induced voltage are not anticipated to occur as a result of the proposed project. The proposed project may induce a voltage on insulated metal objects near the transmission line ROW; however, the Commission requires that transmission lines be constructed and operated to meet NESC standards as well as the Commission's own electric field limit of 8 kV/m reducing these impacts.

Mitigation

Impacts from NEV as a result of the proposed project are not anticipated; therefore, no mitigation is proposed. The applicant indicates that if a person has a question or concern about stray voltage on their property they should contact their electrical service provider to discuss the situation and the possibility of an on-site investigation.[142]

Potential impacts as a result of induced voltage are reduced or avoided by Commission permit requirements (**Appendices B** and **C**). As a result, potential impacts are not anticipated and further mitigation is not proposed.

5.5 Public Services

Transmission lines have the potential to impact public services, such as roads or airports. These impacts are usually temporary, for example, road closures or restrictions associated with stringing conductors; however, impacts can be long-term if they change the project area in a way that precludes or limits public services.

5.5.1 Airports

Transmission line structures and conductors have the potential to interfere with safe operation of an airport if they are too tall for the applicable safety zone. Airports have different safety zones, which are based on several characteristics, including runway dimensions, the type of aircraft intended to use the runway, and the type of approach

[142] Application, page 6-9.

procedures used by the aircraft.[143] These characteristics determine necessary setback distances for transmission line structures.

The Aitkin Municipal Steve Kurtz Field Airport (KAIT) is approximately 2.5 miles southwest of the proposed location of the Rice River Breaker Station.[144] There are no other airports within 10 miles of the Proposed Project.

Potential Impacts

Great River Energy contacted the MnDOT, Office of Aeronautics regarding the potential for the Proposed Project to affect airport operations in the region. In an August 17, 2015, email, MnDOT indicated that it did not see any issues with the Proposed Project.[145]

Mitigation

No impacts to airports will occur as a result of the Proposed Project; therefore, no mitigation is proposed.

5.5.2 Emergency Services

Transmission lines have the potential to impact access to emergency services, for example, through interference with electronic communication systems or traffic delays. The Aitkin County Sheriff's office operates the 9-1-1 call center and dispatches fire, rescue, emergency medical, and law enforcement within the project area.[146] Impacts to emergency services in the project area could result from (1) an inability to communicate that there is an emergency or (2) an inability to respond to an emergency.

Potential Impacts

Potential impacts to electronic communication systems due to the project are discussed in Section 5.3. No impacts to communications systems are anticipated; therefore no impacts to the community's ability to communicate regarding an emergency are anticipated. During construction of the Proposed Project, there may be temporary impacts to roads in the form of traffic delays which could impede responses to an emergency. Short-term localized traffic delays are anticipated during construction. However, these impacts are anticipated to be minimal (see discussion above).

No impacts to emergency services are anticipated once the project is operational.

Mitigation

Potential impacts can be mitigated by notifying emergency responders of traffic interruptions. No long-term impacts are anticipated; therefore, no mitigation is proposed.

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143 *See generally* Minn. R. 8800.
144 World Airport Codes https://www.world-airport-codes.com/
145 Application, page 7-14, Appendix E.
146 Aitkin County Sherriff's Office, https://www.co.aitkin.mn.us/departments/public-safety/public-safety.html ,

5.5.3 Roads and Highways

As shown in **Table 15**, the evaluated route alternatives parallel existing roads for the majority of their length.

Table 15: Route Comparison - ROW followed

ROW followed	Parallel Length (Miles)					
	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
US Highway 169	12.6	11.5	12	9.6	8.5	9.0
Other Roads	0.3	2.0	1.2	0.5	2.2	1.4
Pipeline	0	0	0	3.1	3.1	3.1
Cross-Country	0	0.3	0.3	0	0.3	0.3
Total Length	12.9	13.8	13.5	13.2	14.1	13.8

Routing policy indicates a preference for consolidating transmission with existing infrastructure including roads, pipelines, and other transmission lines. MN Statute 216E.03, subd. 7(b)(12)(e) directs the Commission to consider locating routes located on existing HVTL route and parallel existing highway ROW and if the route selected does not follow existing HVTL and highway ROWs, the Commission must state the reasons those ROWs are not followed.

In its November 10, 2015, comment letter, MnDOT indicated its desire to work to accommodate HVTLs, such as the Proposed Project, within or as near as feasible to trunk highway rights of way in a manner that preserves "the safety of the traveling public and highway workers and effective operation of the highway system now and into the foreseeable future."[147] The trunk highway system includes "the interstate and U.S. highway systems as well as other state highways."[148]

MnDOT's most recent Capital Improvement Plans for District 1 and District 3 identify pavement replacement projects but no highway expansions or other large projects scheduled along US Highway 169 through 2025.[149]

Potential Impacts

During project construction short-term, localized traffic delays along US Highway 169 due to construction activity, material delivery and worker transportation could impact transportation in the project area.[150]

147 MnDOT Scoping Comments, November 10, 2015, eDockets No. 201511-115606-01
148 Minnesota House Research Department (October 2014) *Short Subjects: Trunk Highway System*: http://www.house.leg.state.mn.us/hrd/pubs/ss/ssthf.pdf.
149 MnDOT, District 1 10 Year Capital Highway Improvement Plan (December 2015) http://www.dot.state.mn.us/planning/10yearplan/pdf/2016/D1%20ADA.pdf; District 3 10 Year Capital Highway Improvement Plan (December 2015) http://www.dot.state.mn.us/planning/10yearplan/pdf/2016/D3%20ADA.pdf (accessed March 1, 2016)

Mitigation

Impacts to roads and vehicular traffic can be mitigated through coordination with the appropriate state and local authorities, as well as by alignments, and pole placements that minimize interference with roadways.

In its Application, Great River Energy has proposed implementing a number of mitigation measures to ensure that safety requirements are maintained throughout construction and operation of the Proposed Project and that impacts to traffic are minimized:

- Final transmission line design will ensure that required clearances are met or exceeded.
- Poles will be located outside of existing utility easements.
- In areas where facilities will be within or overlap existing road ROW Great River Energy will work with MnDOT and other agencies to secure the appropriate permits.
- Temporary construction access will be along transmission line ROW or though short spur trails from existing roads to the ROW.
- Temporary guard structures would be used to string conductor over roads and railroads.
- Equipment located on roads or road shoulders will have appropriate warning lights;
- Great River Energy will coordinate with state, county, and local governments to coordinate construction activities and ensure that construction is performed in accordance with agency procedures.
- if necessary, pilot vehicles will accompany the movement of heavy equipment, which will be delivered at a time to avoid traffic congestion and reduce dangerous situations on the roadway; traffic control barriers and warning devices will be used as necessary; and, lastly, should the transmission line will cross 48th Ave SW, temporary guard structures will be used to support the conductor above vehicle traffic.[151]

5.5.4 Utilities

Transmission lines have the potential to damage or interfere with the use of public utilities. The presence of a transmission line could also preclude construction and operation of new utility infrastructure.

Utilities within one-mile of the project area are typical of other rural areas across Minnesota. The proposed project is in a rural area and is not serviced by city water supply or sanitary sewer. Water and sanitary services are supplied to area residences by individual wells and septic systems. Electrical service in the project vicinity is provided by Milles Lacs Energy

[150] Application, page 7-13.
[151] Application, Section 7.2.8

Cooperative. Natural gas service may be provided in some areas of the Proposed Project by Minnesota Energy Resources, but most residences are served by propane.[152]

Potential Impacts

Impacts to water utilities could occur if transmission line structures damaged or impeded the use of wells or septic systems. The route alternatives evaluated are primarily located along roadways, minimizing the potential to impact wells and septic systems.

Impacts to electric utilities are expected to be minimal. Short-term outages of Minnesota Power's existing Line 13 may be necessary to connect that line to the Rice River Breaker Station, but impacts to the transmission grid are not expected.[153]

Mitigation

Construction impacts to utilities can be avoided by marking underground utilities prior to construction and avoiding these areas during construction. The location of natural gas and oil pipelines, septic tanks, wells, and underground distribution lines will identified during engineering surveys once a route is determined.[154]

Great River Energy will coordinate with Minnesota Power to schedule any outages of Minnesota Power's Line 13 required to connect the existing line to the breaker station.[155]

5.6 Land-Based Economies

Transmission lines have the potential to impact land-based economies. Transmission line structures and conductors may prevent or limit use of the landscape for other purposes.

Transmission lines have the potential to impact land-based economies. Transmission lines and poles are a physical presence on the landscape that can prevent or otherwise limit use of the landscape for other purposes. In general, and for safe operation of the line, buildings and tall growing trees are not allowed in transmission line rights-of-way, while many agricultural uses can continue within the ROW. This limitation can create impacts for commercial businesses and forestry.

Impacts to land-based economies due to the Proposed Project are anticipated to be minimal to moderate. Impacts to agriculture are anticipated to be minimal. Impacts to forested lands and to forestry are anticipated to be moderate. The project area includes substantial amounts of forest and impacts to trees are difficult to avoid and minimize. No impact to mining activities is anticipated, as there are no identified gravel pits or mines in proximity to any of the route alternatives evaluated.

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152 Minnesota Energy Resources, Service Area Map: http://www.minnesotaenergyresources.com/company/area.aspx
153 Great River Energy, response to Question 3, Appendix F
154 Application, Section 7.2.8
155 Great River Energy, response to Question 3, Appendix F.

5.6.1 Agriculture

Although Aitkin County is not considered to be a top agricultural producer relative to other areas of Minnesota, agriculture is a land-based economic resource in the project area. Approximately 9.6 percent of Aitkin County is in agricultural production; the average farm size in the county is 260 acres.[156] Agricultural lands in the project area are predominantly pasture and hay, with some areas of cultivated crops (**Table 5**). Crops grown in the area include hay crops and silage, corn, soybeans, and wheat.[157] Farms in the area raise a variety of livestock including beef and dairy cattle and poultry.[158]

Impacts to agricultural operations due to transmission lines fall generally into two types – temporary and permanent impacts. Temporary impacts are impacts due to construction activities. These activities could temporarily limit the use of fields or could cause impacts to crops and soils due to soil compaction or disruption of drainage infrastructure.

Permanent agricultural impacts are impacts due to the physical presence of transmission line poles in agricultural fields. The footprint of a pole can be relatively small – e.g., the footprint of a pole for the Proposed Project is approximately four square feet.[159] However, the impact of such poles can be greater than their footprint in that they can (1) impede the use of farm equipment, (2) interfere with aerial spraying, and (3) impede the use of irrigation systems. These physical impacts can lead to financial impacts, e.g., loss of farming income, decrease in property value.

Potential Impacts

Impacts to agricultural operations as a result of project are anticipated to be minimal. Agricultural areas along the Proposed Project are predominantly along the southern portion of the route alternatives evaluated. As shown in **Table 15**, the route alternatives evaluated in this document cross between 3.1 and 4.4 miles of agricultural land. The transmission line ROW will cross approximately 38 to 53 acres of farmland.[160] However, as agricultural land within a transmission line ROW is generally available for agricultural production, the permanent impact to agricultural operations is much less. The amount of land that will be permanently removed from agricultural production as a result of the project is approximately 190 to 265 square feet.

156 CN and Route Permit Application, Section 9.4.1.
157 U.S. Department of Agriculture, Census of Agriculture, 2012, Aitkin County, Minnesota, http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota/cp27001.pdf .
158 Id.
159 Application, p. 7-20.
160 Assumes 100 feet ROW along agricultural length.

Table 16: Agricultural Impacts by Route Alternative

	Route	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Ag Length	feet	18,440	23,220	21,730	16,590	21,370	19,880
	miles	3.5	4.4	4.1	3.1	4.0	3.8
Impact[161]	Square feet	210.7	265.4	248.3	189.6	244.2	227.2

If transmission line structures are placed along field edges, either within or near the road ROW, then the amount of agricultural land unavailable for cultivation will be limited to approximately 190 to 250 square feet. However, if structures are placed within fields, they can obstruct the use of farm equipment and have a more significant impact on agricultural production. Structures within fields can also prevent the use of larger-scale agricultural equipment. Where this is the case, farmers may be impacted by the cost of buying equipment that is appropriately sized to work fields with transmission line structures.

No impacts to irrigation systems are anticipated as a result of the Proposed Project.[162]

Temporary impacts, such as soil compaction, crop damage, and disruption to drainage systems may occur during construction of the Proposed Project. Construction vehicles are relatively large and can cause rutting and compaction at structure locations and along the transmission line ROW.

Mitigation

Impacts to agricultural operations can be avoided and mitigated by prudent routing – i.e., by selecting a route that avoids agricultural fields to the extent possible and minimizes intrusion into agricultural fields by following existing infrastructure ROW, field lines, and property lines. Where poles are placed in fields, impacts can be mitigated by not placing structures diagonally across field, but rather parallel to existing infrastructure ROW or field lines.

Agricultural impacts can also be mitigated by construction and remediation measures. Great River Energy has committed to the following measures to mitigate agricultural impacts from the project:[163]

- Scheduling construction during lulls in agricultural activity to the extent possible.
- Limiting movement of crews and equipment to the transmission line ROW to the greatest extent possible and obtaining permission from the landowner for construction activities outside of the ROW.
- Repairing and restoring areas disturbed by construction to pre-construction contours so that all surface drain naturally.

[161] Impacts are calculated as follows: (length/average span)* permanent impact per structure. Average spans are assumed to be 350 feet, permanent impacts are assumed to be 4 feet per structure.
[162] Application, at p. 7-20
[163] Application, Section 7.4.1.

- Repairing ruts and soil compaction; filling, grading, scarifying, harrowing, disking.
- Placing structures to accommodate existing or proposed irrigation systems.
- Promptly repairing or replacing fences, gates and other improvements that may be removed or damaged during construction.
- Providing compensation to landowners for any crop and property damage.[164]

Commission route permits require permittees to compensate landowners for damage to crops and drain tile (**Appendices B** and **C**).

5.6.2 Forestry

Approximately 38.5 percent of Aitkin County is forested.[165] The Waukenabo State Forest is comprised of scattered parcels located between the cities of Aitkin and Palisade.[166] Although most of the parcels comprising the forest are located west and north of the Proposed Project, the Proposed Project crosses through a portion of the Waukenabo State Forest. The Minnesota Division of Forestry promotes the conservation, enjoyment and use of Minnesota's forests by providing a long-term, sustainable yield of forest resources from state forest lands; improving the health and productivity of other public and private forest lands and community forest lands; and protecting life, property, and natural resources from wildfires.[167]

Forest cover along the route alternatives is summarized in **Table 17**. Deciduous forest is the predominant land cover in the forested areas (**Table 5**). Forested areas in the Project Area are logged for both commercial sales and personal use (such as firewood).[168]

Potential impacts to forested areas and forestry operations are due to the removal of trees. In general, and for safe operation of the line, tall growing trees are not allowed in transmission line rights-of-way. Removal of trees directly impacts the resource which is being used by landowners or sold by forestry operations.

164 Application, Section 7.4.1
165 http://www.mngeo.state.mn.us/maps/LandUse/lu_aitk.pdf .
166 http://dnr.state.mn.us/state_forests/sft00059/index.html
167 DNR (n.d.) *Division of Forestry*, Retrieved January 7, 2016, from: http://dnr.state.mn.us/forestry/index.html.
168 Application, at p. 7-21

Table 17: Forested Areas by Route Alternative

Route Alternative	Forested Acres		Percentage	
	ROW	Route	ROW	Route
Route A* [169]	6.0 (6.6)	61.6	3	8
Route B	5.4	48.9	3	7
Route C	8.6	53.8	5	7
Route A - Pipeline	11.1 (11.7)	58.2	6	10
Route B - Pipeline	10.5	39.1	6	8
Route C - Pipeline	13.7	44.3	8	8

Potential Impacts

Direct impacts to forested areas and forestry operations, including timber harvest, are expected to be minimal. Depending upon the route, clearing the ROW will remove between approximately 5.4 and 13.7 acres of forested cover types, with routes along the Pipeline Alternative removing a slightly larger acreage of trees. Given the amount of forested cover in Aitkin County generally, this impact to the County is minimal. Unlike agricultural impacts, these impacts are permanent throughout the ROW and timber harvest for commercial or other uses will be precluded permanently.

Mitigation

Impacts to forested areas and forestry operations, including timber harvest, can be avoided or minimized by prudent routing and placement of structures within the route. Additionally, impacts to forestry resources can be mitigated by new plantings within the ROW of compatible cover types, or planting of tall-growing trees in areas outside the ROW. The applicant indicates that compensation for the removal of vegetation within the ROW will be offered to landowners during easement negotiations, and landowners will be given the option to keep the timber cut within the easement area on their property.[170]

5.6.3 Mining

Impacts to mining operations can occur if transmission lines interfere with access to, or the removal of, sand, gravel or mineral resources.

There are no known gravel pits or other mining activity within the ROW.

Potential Impacts

Since no known mining operations exist in the ROW, no impacts will occur to mining economies.

[169] If impacts vary between alignments along the west and east side of US Highway 169, impacts on the east side are included in parentheses.
[170] Application, page 7-18.

Mitigation

No impacts to mining will occur as a result of the proposed project; therefore, no mitigation is proposed.

5.6.4 Tourism and Recreation

Tourist activities within the project area are most generally associated with the recreational activities. Transmission lines may have a negative impact on recreational activities if the transmission line interferes with the natural resources that provide these activities, for example, changing the aesthetic of a recreational destination in a way that reduces visitor use. Alternatively, a transmission line might increase recreational opportunities, for example, a ROW through a previously wooded area might provide increased opportunities for hunting or wildlife viewing. Transmission lines can impact tourism if they affect the overall experiences of visitors to tourism sites, either through aesthetic impacts, noise, or degradation of the natural or man-made resources that provide for tourist-type activities.

Aitkin County provides approximately 220,000 areas for recreation, including a number of lakes, rivers, state Wildlife Management Areas (WMAs), state forests, campgrounds, and recreational trails. provides opportunities for a number of outdoor recreational activities including fishing, hunting, wildlife-viewing, bird-watching, canoeing, kayaking, boating, swimming, hiking, biking, camping, cross-country skiing, as well as all-terrain vehicle (ATV) and snowmobile riding.[171]

The Proposed Project would follow US Highway 169 through the Aitkin Wildlife Management Area (WMA) and along a portion of the Waukenabo State Forest.

The Aitkin WMA is approximately 3000 acres of mixed upland brush and mixed forest (aspen, bur oak, basswood, and birch) and marshy or low grassland areas. The WMA is managed for deer, bear, sharp-tailed and ruffled grouse, sandhill cranes, and short-eared owls. US Highway 169 passes through a mixture of low wetlands and brush.[172]

The Proposed Project would cross the Aitkin Sno Drifters and Palisade snowmobile trails either along US Highway 169 or the Pipeline Route Alternative (**Appendix D, Map D1**, sheet 6).[173] The Proposed Project would cross the Mississippi River at one of three locations. The project is not within one-mile of any State Parks, State Trails, Aquatic Management Areas, Scientific and Natural Areas, federal or county parks, or federal forests or refuges.

[171] Application, page 7-11.
[172] DNR, Aitkin WMA: http://www.dnr.state.mn.us/wmas/detail_report.html?map=COMPASS_MAPFILE&mode=itemquery&qlayer=bdry_adwma2py3_query&qitem=uniqueid&qstring=WMA0123801
[173] Application, pp. 7-11 – 7-13; Aitkin County Recreation: http://www.co.aitkin.mn.us/departments/Land/recreation.html

Potential Impacts

Impacts to tourism and recreational opportunities from the Proposed Project are anticipated to be minimal to moderate depending upon the route selected.

Noise impacts from project construction are anticipated to be short-term and intermittent and operational noise will be below ambient noise levels. The Proposed Project parallels existing roadways and electric distribution infrastructure. Some tree clearing, particularly within the Aitkin WMA and the portions of the Waukenabo State Forest would be required, but is not expected to alter recreational opportunities in those areas. There would be no permanent direct impact to the snowmobile trails, although to the extent that construction occurs during the winter access to the trails may be temporarily impacted.

The alignment alternative that follows the east side of US Highway 169 across the Mississippi River may indirectly impact the use of a boat launch. Aitkin County maintains a concrete boat ramp to access to the Mississippi River on the northeast side of the US Highway 169 Bridge.[174] Vehicle access to the ramp is from 442nd Lane. MnDOT road ROW in this area is unknown at this time. Because the Proposed Project would be located outside MnDOT road ROW, an alignment on the east side of US Highway 169 may impinge upon access to the boat ramp.

As discussed in Section 5.3.1, route alternatives B and C would each introduce a new river crossing in a previously undisturbed area and follow along a portion of rural road that is used recreationally by vehicles and bicyclists following the Great River Road between Bemidji and Aitkin. Construction and operation of a route along the Great River Road would not have a direct effect upon the use of the road, beyond some short-term delays or re-routings during construction, but may alter the visual experience of users of the river or of a short segment of the Great River Road for recreational purposes.

Mitigation

Impacts to recreation and tourism can be mitigated by selecting routes and alignments that avoid resources utilized for recreational purposes. Impacts can also be mitigated by reducing impacts to natural landscapes during construction.

5.7 Archeological and Historic Resources

Archeological resources are locations where objects or other evidence of archaeological interest exists, and can include aboriginal mounds and earthworks, ancient burial grounds, prehistoric ruins, or historical remains.[175] Historic resources are sites, buildings, structures or other antiquities of state or national significance.[176]

[174] DNR. Public Water Access – Aitkin County: http://files.dnr.state.mn.us/maps/water_access/counties/aitkin.pdf
[175] *See* Minn. Stat. 138.31, subd. 14.
[176] *See* Minn. Stat. 138.51.

Great River Energy retained Merjent to perform a Phase IA Cultural Resources Assessment of the Project Area (within one mile of the proposed route) in order to identify recorded cultural sites and assess the potential for unrecorded cultural sites in the Project Area. Merjent searched historic records maintained by the Minnesota State Historic Preservation Office (SHPO) and examined current and historic maps for Project Area In addition to a search of SHPO records, historic maps and aerial photographs of the Project Area were also examined.[177]

The SHPO records search identified one previously recorded archaeological site east of all the route alternatives evaluated in this EA. The search also identified 12 previously inventoried historic structures. The integrity of the identified structures was not defined, and none of the existing structures has been evaluated for eligibility for listing on the National Register of Historic Places (NRHP).

The Phase Ia literature search concluded that it is unlikely that the Proposed Project would have an adverse impact on any known or suspected cultural resources and that architectural review of potential impacts from the Proposed Project to existing historic structures is not recommended. After reviewing the results of the Phase Ia literature search, the Minnesota State Historic Preservation Office (SHPO) concluded that there are no properties listed in the national or state register of historic places and no known or suspected archaeological properties that would be affected by the proposed project.[178]

Potential Impacts

Construction of transmission projects can disrupt or remove archeological resources. Placement of a transmission line near historic resources has the potential to impair or decrease the historic value of the resource. Based on the cultural resource literature review and SHPO concurrence, no direct or indirect impacts to archaeological or historic resources are anticipated within the one-mile ROI.

Mitigation

Avoidance of known archaeological and historic resources is the preferred mitigation strategy. If previously unidentified archaeological sites are found, the applicant indicates they will stop construction and contact SHPO to determine how best to proceed.[179] Should human remains be discovered, ground disturbing activity will stop and local law enforcement will be notified.[180]

No impacts to archeological and historic resources are anticipated; therefore, no mitigation beyond Section 5.2.13 of the Generic Route Permit Template (Appendix C) is proposed.

[177] Application at Appendix E
[178] Application, Appendix E, July 15, 2015, State Historic Preservation Office letter to Mark Strohfus
[179] Application, page 7-19.
[180] Application, page 7-19.

5.8 Natural Resources

Transmission lines have the potential to impact the natural environment. These impacts are dependent upon many factors, such as the type of transmission line and how it is designed, constructed and maintained. Other factors such as the environmental setting must also be taken into account. Impacts can and do vary significantly both within, and across, projects.

5.8.1 Air Quality

Overall air quality in Minnesota has improved over the last 20 years, but current levels of air pollution still contribute to health impacts.[181] Air quality in the project area is relatively better than more populated areas of the state, e.g., Minneapolis and St. Paul.[182]

Potential Impacts

Potential air quality impacts due to the project are of two types: (1) emissions of ozone and nitrous oxide during operation, and (2) dust caused by construction activities.

Ozone and Nitrous Oxide

Transmission lines have the potential to produce small amounts of ozone (O_3) and nitrous oxide (NO_X). These compounds are created by the ionization of air molecules surrounding the conductor. Ozone production from a conductor is proportional to temperature and sunlight and inversely proportional to humidity.

Ozone and nitrous oxide are reactive compounds that contribute to smog and can have adverse impacts on human respiratory systems.[183] Accordingly, these compounds are regulated and have permissible concentration limits. The State of Minnesota has an ozone limit of 0.08 parts per million (ppm).[184] The federal ozone limit is 0.075 ppm.[185] Ozone and nitrous oxide emissions from the new 115 kV line are anticipated to be well below these limits.[186]

Construction Dust

Fugitive dust is a particulate air pollutant. Construction activities along the proposed route, such as clearing vegetation and driving utility poles, may create exposed areas susceptible to wind erosion. Construction of the project will create dust and cause emissions from construction vehicles, i.e., diesel exhaust. The magnitude of emissions is dependent on weather conditions and the specific construction activity taking place. Any adverse impacts are anticipated to be localized and temporary.

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181 Air Quality in Minnesota, 2015 Report to the Legislature, http://www.pca.state.mn.us/index.php/about-mpca/legislative-resources/legislative-reports/air-quality-in-minnesota-reports-to-the-legislature.html.
182 AirCompare – County Comparisons, http://www.epa.gov/aircompare/compare.htm.
183 Six Common Air Pollutants, U.S. Environmental Protection Agency, http://www.epa.gov/air/urbanair/.
184 Minn. R. 7009.0800, https://www.revisor.mn.gov/rules/?id=7009.0080.
185 Ground-level Ozone, U.S. Environmental Protection Agency, http://www.epa.gov/glo/actions.html.
186 Application, p. 7-25.

Mitigation

Impacts to air quality from project construction are expected to be short-term and minor; therefore. Great River Energy indicates that appropriate dust control measures will be implemented to reduce potential fugitive dust emissions.[187] No additional mitigation is proposed.

5.8.2 Geology and Topography

The topography along the Proposed Project is relatively level, with the exception of the Mississippi River Crossing. The geology of the area surrounding the Proposed Project is comprised of Middle Precambrian bedrock is covered by glacial drift varying in depth from 100 to 300 feet.[188] "

Potential Impacts

Transmission structures will be buried to an approximate depth of nine feet. The Proposed Project will not impact topography or geology.

Mitigation

No impacts to topographic or geologic resources will occur; therefore, no mitigation is proposed.

5.8.3 Surface Water

The Proposed Project spans two watersheds of the Upper Mississippi Basin. For the most part, the Proposed Project is located in the Upper Mississippi – Brainerd watershed of the Upper Mississippi River basin, although a small portion in the northern portion of the Proposed Project is located in the Mississippi River-Grand Rapids Watershed.[189] The Proposed Project would cross the Rice River, Mississippi River and White Elk Creek There are a number of lakes in the project area, and the Proposed Project passes approximately 1,200 feet from Waukenabo Lake (**Appendix D**, **Map D1**, sheet 6 and **Map D3**, sheet 4)).[190]

These lakes, rivers, and streams are classified by the Minnesota Department of Natural Resources (DNR) as public waters in Minnesota.[191] Public waters are waters of the state – i.e., waters which belong to the state of Minnesota as a whole. Potential impacts to these waters and their uses are regulated by the DNR.[192] To work in public waters or to cross public waters requires a permit from the DNR (see Section 2.6).

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187 Id.
188 DNR. Groundwater Provinces, http://dnr.state.mn.us/groundwater/provinces/index.html .
189 MPCA. Watersheds. https://www.pca.state.mn.us/water/watersheds/mississippi-river-brainerd#overview.
190 Id.
191 Application, at p. 7-30; Definition of Public Waters, DNR, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/pw_definition.html.
192 Public Waters Work Permit Program, DNR, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/index.html.

The MPCA designates certain waters as impaired based on violations of water quality standards. The portion of the Mississippi River crossed by the Proposed Project (all evaluated routes) is designated as impaired by the MPCA based on the concentration of Mercury in fish tissue.[193]

Potential Impacts

Because the Proposed Project avoids or spans surface waters in the project area, impacts to surface waters as a result of the Proposed Project are anticipated to be minimal. During construction of the project, there is potential for adverse impacts to surface waters due to vegetation clearing, ground disturbances, and construction traffic. These activities can speed water flow and expose previously undisturbed soils, increasing erosion and the potential for sediment to reach surface waters. Disturbed soils will generally be limited to pole and breaker station locations; however, areas outside these locations may be disturbed by construction traffic and by removal of vegetation.

Mitigation

The primary means of mitigating impacts to surface waters is to select routes, alignments, and pole placements that avoid or span surface waters. All of the route alternatives evaluated would cross waterways. Great River Energy indicates that the Proposed Project will be designed to span all rivers and streams.[194]

Where waterways must be crossed to pull conductors and shield wires, Great River Energy will minimize potential impacts by crossing by foot, using boats, or crossing across ice during winter conditions. Great River Energy will employ BMPs to prevent soil erosion and establish equipment fueling and lubrication locations away from waterways.[195] Disturbed soils will be re-seeded with appropriate seed mixes to prevent any long-term erosion during the operating life of the Proposed Project.[196]

Permittee use of best management practices to control erosion and minimize impacts to water resources is a standard Commission route permit condition (see **Appendices B** and **C**).

Construction of the project will require a number of permits from state and federal agencies, beyond a route permit from the Commission, e.g., NPDES/SDS stormwater construction permit (see Section 2.3). Many of these permits and approvals are directed at the prevention and mitigation of water resource impacts. Specifically a License to Cross Public Powers and Lands will require Great River Energy to demonstrate that the water crossings are consistent with best practices.

A Vegetation Management Plan that includes a discussion of management of shoreland areas is sometimes included as a condition of Route Permits (**Appendix C**).

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193 MPCA. Maps of Minnesota's Impaired Waters and TMDLs. https://www.pca.state.mn.us/water/maps-minnesotas-impaired-waters-and-tmdls
194 Application, Section 7.6.2.
195 Application, at p. 6-4
196 Application, Section 7.6.2.

5.8.4 Groundwater

Transmission line structures have the potential to impact groundwater directly. These impacts are generally associated with project construction, particularly when foundations require drilling or excavation to depths that penetrate shallow water tables. Indirect impacts to groundwater, such as increased sedimentation through erosion, can also occur through impacts to surface water.

The Proposed Project is located in the Central Groundwater Province and is characterized by thick sand and clay glacial drift over Precambrian and Cretaceous bedrock. [197] Groundwater in this province is linked with the lakes, streams and wetlands of the region and is generally considered to have good availability.[198]

According to *Ground Water Contamination Susceptibility in Minnesota*, the project area contains areas of low to medium susceptibility to contamination. These regional maps are "adequate for large scale appraisals," but are not to be used for county or local "zoning, siting, regulation and other activities that require more detailed mapping."[199]

Potential Impacts

Impacts to groundwater due to the project are anticipated to be minimal. Potential impacts to groundwater from the project could occur indirectly through surface water or directly from structure foundations. Impacts to surface waters can lead to impacts to groundwater; thus, concerns are similar – i.e., construction activities which lead to sedimentation, directly or through disturbed soils and vegetation.

Direct impacts to groundwater could occur as a result of the construction and placement of transmission line structures. Although Great River Energy anticipates that most structures will not require concrete foundations, concrete foundations may be used for select structures, depending upon final design.[200] If and where concrete foundations are used, some portion of the soluble components of the concrete will leach into groundwater prior to the setting and hardening of the concrete. If dewatering is necessary to place the foundations, the water removed from foundation sites could contain sediments or pollutants that may be introduced into surface waters.

197 DNR (n.d.) *Groundwater Provinces*. http://dnr.state.mn.us/groundwater/provinces/index.html.
198 DNR (2005). Where is Groundwater and is it Available for Use? http://files.dnr.state.mn.us/waters/groundwater_section/sustainability/whereisGW.pdf
199 MPCA (June 29, 1989) *Ground Water Contamination Susceptibility in Minnesota.* http://files.dnr.state.mn.us/waters/groundwater_section/mapping/sensitivity/docs/porcher1989.pdf.
200 Application, at 6-4

Mitigation

Impacts to groundwater can be mitigated by measures to prevent impacts to surface waters (discussed above). Direct impacts to groundwater, i.e., leaching from concrete poured at depths where groundwater is present, are anticipated to be minimal due to the anticipated minimal use of concrete foundations for the project and the relatively low solubility of concrete components.

5.8.5 Wetlands

Wetlands provide valuable ecological services such as floodwater retention, nutrient assimilation, sediment entrapment, and wildlife habitat. Wetlands can be found in a variety of ecoregions and vary with soil, hydrology, and vegetation.[201] Wetlands that are hydrologically connected to the nation's navigable rivers are protected federally under Section 404 of the Clean Water Act. Under the Clean Water Act, Section 401 water quality certification is also required for activities that may result in a discharge to waters of the United States. The MPCA administers Section 401 water quality certification on non-tribal lands in Minnesota. If the USACE authorizes the project under its General Permit/Letter of Permission permitting program, the MPCA waives its Section 401 Water Quality Certification authority. In Minnesota, wetlands are also protected under the Wetland Conservation Act, which is administered by the Board of Water and Soil Resources (BWSR) and the identified Local Government Unit.

The USFWS began producing maps of wetlands based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s; these wetlands are known as the National Wetland Inventory (NWI). It is important to note that NWI wetlands are based on aerial imagery and are not field verified. Nevertheless, NWI wetlands provide a useful starting point for identifying potential wetland areas.

NWI Wetlands are present throughout the project area (**Appendix D, Map D3**). The wetlands along the ROW are typically seasonal in their extent. Depending on the route selected, there are between approximately 17 and 36 acres of wetlands within the anticipated ROW for the project (**Table 18**). The wetland characteristics along the ROW are similar to those of the route, and are predominantly comprised of scrub-shrub and forested wetlands. Forested wetlands are more heavily represented along the route alternatives that would follow the Pipeline Alternative (Route Segment I).

[201] MPCA. Types of Wetlands, http://www.dnr.state.mn.us/wetlands/types.html.

Table 18: NWI Wetlands within Anticipated Rights-of-Way

Cover Type		Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Forested/ Scrub-Shrub	Acres	2.75	2.75	2.75	7.02	7.02	7.02
	%	16	13	16	22	19	22
Forested	Acres	0.10	0.26	0.26	4.12	4.28	4.28
	%	1	1	2	13	12	13
Scrub-Shrub Emergent	Acres	6.17	7.97	6.17	9.76	11.55	9.76
	%	37	39	36	30	32	30
Scrub-Shrub	Acres	7.21	7.28	7.28	10.96	11.03	11.03
	%	43	36	43	34	31	34
Unconsolidated Bottom	Acres	0.61	0.48	0.55	0.61	0.47	0.55
	%	4	2	3	2	1	2
Emergent	Acres	N/A	1.68	N/A	N/A	1.68	N/A
	%	N/A	8	N/A	N/A	5	N/A
Total Acres		16.86	20.41	17.01	32.48	36.03	32.63

Potential Impacts

Construction and maintenance of the Proposed Project has the potential to result in long-term and temporary loss of wetlands or wetland function. Direct impacts would occur in areas where construction activities occur within wetlands. During construction, there is also the possibility for indirect impacts to wetlands from sediment as the ground is disturbed by excavation, grading and construction traffic.

Crossing a wetland does not necessarily mean that the wetland will be impacted; in some cases a wetland could be crossed by spanning it. However, where a wetland is crossed and such crossing requires construction activities within the wetland, there is a strong potential for impacts. Construction of transmission line structures typically includes vegetation clearing, movement of soils, and construction traffic. These activities could impair the functioning of wetlands. Even small changes in hydrology (e.g., periods of inundation, changes in flow, sedimentation) can impair the functioning of wetlands.

Great River Energy anticipates that the Proposed Project will span all streams and rivers along the permitted route. However, given the prevalence of wetlands along the route alternatives evaluated, it is unlikely that all wetlands can be spanned. Permanent impacts to wetlands would occur where structures are located within wetland boundaries, and are estimated to be approximately 20 square feet per structure. Forested wetlands within the transmission line ROW would likely undergo a permanent change of vegetation type as a result of the Proposed Project. As discussed in Section 3.6, transmission lines cannot be safely or reliably operated with trees growing up and into them. Therefore, existing trees

must be removed throughout the ROW, including forested wetlands.[202]

Mitigation

Potential impacts to wetlands can be mitigated by selecting routes, alignments, and pole placements that avoid wetlands. If wetlands cannot be avoided, impacts can be mitigated by a variety of strategies including: use of construction mats, constructing during winter months when the ground is frozen, assembling structures on upland areas prior to site installation, and transporting crews and equipment, to the extent possible, over improved roads and via routes which minimize transit over wetlands.[203]

Great River Energy has stated its intention to minimize wetland impacts during construction through implementation of best management practices, including but not limited to:

- Minimizing travel though wetlands by accessing wetlands using the shortest route and, where possible, accessing poles located near or in wetlands by roadways.
- When practicable, assembling structures on upland areas before bringing them to the site for installation.
- Placing staging and stringing setup areas away from water resources to the extent possible.
- Completing construction activities during frozen ground activities, when possible.
- Using construction mats to protect wetland vegetation.
- Potentially using all-terrain construction vehicles, designed to minimize impacts to soils in damp areas.[204]

The Proposed Project will require a Section 10 Permit from the U.S. Army Corps of Engineers (USACE) and may require a regional general permit from the USACE, under Section 404 of the Clean Water Act.[205] The USACE may require wetland mitigation for the conversion of forested wetlands to scrub-shrub or emergent wetlands.[206] The USACE required more detailed project design before it will issue a permit.

Commission route permits require permittees to avoid and minimize wetland impacts (**Appendices B** and **C**).

5.8.6 Floodplains

Floodplains are low-lying areas that are subject to periodic inundation due to heavy rains or snowmelt. Floodplain areas are generally found adjacent to lakes, rivers and streams. In their natural state, floodplains provide for temporary water storage during flooding events.

202 Application, Section 7.6.2.
203 Id.
204 Id.
205 Id.
206 Application, at p. 7-34.

Portions of all of the route alternatives are within areas identified as the 100-year floodplain by the Federal Emergency Management Agency (FEMA).[207] Federal and state laws require that local governments take the 100-year floodplain into consideration when planning development. Public utilities are permitted uses within identified floodplains provided the facilities are located in a way that will not significantly affect the flows, heights, or velocities of regional flooding.[208]

Potential Impacts

Impact to the function of the 100-year floodplain in the project area is anticipated to be minimal due to the spacing between structures and the relatively small footprint of the each structure.

Mitigation

No impacts to the 100-year floodplain are anticipated from the Proposed Project and no mitigation measures are proposed.

5.8.7 Soils

Transmission lines have the potential to directly and indirectly impact soils. Direct impacts to soils result from movement or compaction. Removal of vegetative cover can cause indirect impacts to soils through increased susceptibility to erosion.

Soils in the project area have been formed by glaciation and alluvial deposits. The depth of glacial drift over bedrock varies from 100 to 300 feet.[209] Soils in the area are generally very deep. Consistent with the prevalence of wetlands along the Proposed Project, many of the soils are characterized as poorly drained, although areas of more well drained soils, typical of cropland, are also located along the Proposed Project.[210]

Potential Impacts

Construction activities have the potential to compact the soil as the result of the movement of heavy construction equipment. Vegetation will be cleared to facilitate construction of the project. This clearing will temporarily expose soils to the elements, which could cause soil erosion. Loss of soils during construction could adversely impact water resources in the area.

Mitigation

Potential impacts to soils can be mitigated by using best management construction practices. Great River Energy indicates a variety of methods will be employed to minimize soil erosion, including the prompt revegetation of disturbed soils.[211] Common mitigation measure employed to minimize soil erosion include:

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207 Federal Emergency Management Agency, FEMA Flood Map Service Center, https://msc.fema.gov/portal/
208 Minn. R. 6120, *Shoreland and Floodplain Management,* https://www.revisor.mn.gov/rules/?id=6120
209 Application, Section 7.8.2.
210 Application, Section 7.8.3.
211 Id.

- Scheduling Construction in wetland areas during frozen ground conditions where possible.
- Use of construction mats in wetland areas when construction cannot be performed during frozen ground conditions.
- Seeding to establish temporary and permanent vegetative cover on exposed soil.
- Using mulch to form a temporary and protective cover on exposed soils. Mulch can help retain moisture in the soil to promote vegetative growth, reduce evaporation, insulate the soil, and reduce erosion. A common mulch material used is hay or straw.
- Erecting or using sediment control fences that are intended to retard flow, filter runoff, and promote the settling of sediment out of runoff via ponding behind the sediment fence.
- Using erosion control blankets and turf reinforcement mats that are typically single or multiple layer sheets made of natural and/or synthetic materials that provide structural stability to bare surfaces and slopes.

Measures to mitigate soil erosion are standard Commission route permit conditions (see **Appendices B** and **C**).

5.8.8 Vegetation

Construction of transmission lines often requires the removal or disturbance of vegetation during construction. Additionally, vegetation may be impacted if invasive or non-native species is introduced to the ROW during construction or restoration, or by changes in habitat (e.g., soils, water flows) that adversely impact plant growth. Potential impacts to vegetation due to the Proposed Project are anticipated to be moderate.

Prior to European settlement, vegetation in the area was dominated by lowland birch and aspen-birch. Currently land uses along the Proposed Project are agriculture, recreation, and forest management.[212]

Potential Impacts

Construction of the Proposed Project would require removal of trees within the ROW. Based on the preliminary alignment approximately 5.4 to 13.7 acres of trees would be removed depending upon the route. This would result in a permanent change in vegetation, replacing the trees with lower-growing species.

Mitigation

The primary means of mitigating impacts to vegetation is through prudent routing that avoids tree-clearing and changes in the composition of vegetative cover to the extent

[212] DNR. Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife: Tamarack Lowlands Subsection Profile. (January 2006), http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/tamarack_lowlands.pdf

possible. Mitigation can be achieved, in part, by using existing infrastructure rights-of-way (e.g., roadway, transmission line) to the extent possible in order to minimize tree removal. Mitigation can also be accomplished by spanning plant communities.

Given the existing land cover in the project area, a route that entirely avoids forested areas is probably not possible. The routes evaluated attempt to use existing road ROW to the extent possible; however, the full extent of ROW sharing with existing roads will not be known until a route is selected and information on MnDOT ROW can be used to develop the detailed design of the Proposed Project.

Impacts to vegetation can also be mitigated by a number of other strategies, including:

- Constructing during fall and winter months to limit plant damage and soil compaction.
- Leaving or replanting compatible plants at the edge of the transmission line ROW to provide a buffer between the ROW and surrounding forested areas.
- Replanting on the transmission line ROW with low growing, native species.

Construction practices and revegetation along the route should be designed to avoid the introduction of invasive species – on equipment or through seeds or mulches. Great River Energy indicates that it will minimize the introduction and spread of invasive species by:[213]

- Revegetating disturbed areas using weed-free seed mixes and using weed-free straw and hay for erosion control.
- Removal of invasive species via herbicide and manual means consistent with easement conditions and landowner restrictions.
- Cleaning and inspection construction vehicles to remove dirt, mud, plant, and debris from vehicles prior to arriving at and leaving from construction sites.
- Designation of a Construction Field Representative to oversee implementation of best management practices.

Impacts to vegetation can be mitigated by providing compensation to individual landowners through negotiated easement agreements. Mitigation and restoration measures for impacts to flora are standard Commission route permit conditions (see **Appendices B** and **C**).

A Vegetation Management Plan that describes route clearing and maintenance procedures along the route for the construction and operation for a project is sometimes included as a condition of Route Permits (see **Appendices B** and **C**).

5.8.9 Wildlife

Transmission lines have the potential to impact wildlife through a variety of means including temporary displacement, habitat loss, and, for avian species, collision with transmission line

[213] Application, Section 7.6.4.

conductors. Potential impacts to wildlife due to the Proposed Project are anticipated to be minimal.

The project area includes a variety of habitats including forested areas, grassland, agricultural fields, wetlands, river, lakes and streams (**Appendix D, Map D3**). These habitats support a range of wildlife, including deer, gray wolves, fox, skunks, raccoons, waterfowl, raptors, and songbirds.[214]

The Aitkin WMA provides habitat for Coyotes, foxes, deer, bear, sharp-tail and ruffled grouse, sandhill cranes and a variety of waterfowl, raptors, and songbirds.[215]

Potential Impacts

Impacts to wildlife as a result of the project are anticipated to be minimal. In general, wildlife within the project area are anticipated to have the ability to remove themselves from the potential dangers of project construction and to exist while temporarily displaced from the area. Potential impacts due to construction and displacement are anticipated to be minimal. Construction of the line is not anticipated to affect waterbodies in the project area; thus, impacts to fish that inhabit these waterbodies are anticipated to be minimal. Depending upon the route selected, the Proposed Project will remove between approximately 5.4 and 13.7 acres of forested habitat (**Table 14**). This loss of habitat may cause relocation of wildlife that use this habitat, but this relocation is not anticipated to significantly impact wildlife populations.

Avian species could be impacted by project through collision with transmission line conductors.[216] Collisions are more likely for large-bodied birds with long wing spans such as swans, geese, and ducks. Frequency of collision depends upon the number of birds crossing through the project area and the likelihood that they will utilize the area, e.g., for food, water, resting. Large avian species could also be impacted by electrocution. If the wingspan of a species is of sufficient size that the species can simultaneously contact two conductors or a conductor and a grounding wire, the species could be electrocuted.

Because of the relatively good habitat for avian species in the project area, particularly for waterfowl, impacts to avian species could range from minimal to moderate. However, there are mitigation strategies that can be implemented to minimize these impacts; thus, impacts to avian species are anticipated to be minimal. Likewise, impacts due to electrocution could occur, but these impacts are also anticipated to be minimal, as there are common strategies which can be used to mitigate these impacts.

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214 Application, Section 7.6.3;
DNR, WMA Detailed Report – Aitkin WMA
http://www.dnr.state.mn.us/wmas/detail_report.html?map=COMPASS_MAPFILE&mode=itemquery&qlayer=bdry_adwma2py3_query&qitem=uniqueid&qstring=WMA0123801
DNR, Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife – Tamarack Lowlands Subsection Profile.
http://files.dnr.state.mn.us/assistance/nrplanning/bigpicture/cwcs/profiles/tamarack_lowlands.pdf

215 DNR, WMA Detailed Report - Aitkin WMA

216 Application, Section 7.6.3., DNR Comment letter, November 10, 2015, eDocket No. 201511-115613-01

Mitigation

Potential impacts to wildlife due to the Proposed Project can be mitigated through several strategies. The primary strategy for mitigating impacts is to place routes away from areas known to contain high quality habitat or which serve as migratory corridors. Use of existing rights-of-way can minimize habitat loss and fragmentation. Impacts to wildlife can also be minimized by spanning habitats and minimizing the number of structures in high quality habitat through the use of specialty structures.

Avian impacts can be mitigated by diverting bird flights away from (over) transmission lines. Flights can be diverted through the use of bird flight diverters placed on the static lines above transmission line conductors. Great River Energy has committed in its application to working with the DNR to identify areas where bird diverters would be most effective.[217] The DNR has requested that bird diverters be placed at the Mississippi River and Rice River crossings and along the portion of the route that passes through the Aitkin WMA.[218]

Impacts to avian species caused by electrocution can be mitigated by the use of best practices for conductor spacing and shielding. These practices are codified in Avian Power Line Interaction Committee (APLIC) standards. Adherence to these standards is a standard Commission route permit condition (see **Appendices B** and **C**).

5.8.10 Rare and Unique Resources

Impacts to rare and unique natural resources (flora and fauna) from the Proposed Project could result from ecosystem changes, introduction of invasive species, habitat loss, and, for avian species, collision with transmission line conductors.

The Minnesota biological survey identifies two sites of biodiversity significance, both located on the west side of US Highway 169, in the project vicinity (**Appendix D, Map D5**):

- An area of moderate biodiversity significance in Section 11 of Waukenabo Township.
- An area of high biodiversity significance, including a sedge meadow, in Section 35 of Waukenabo Township. The DNR classifies the sedge meadow as an "uncommon but not rare native plant community in Minnesota."[219]

In addition to the sites of biodiversity significance, there are breeding records of rare birds (**Table 19**) in the vicinity of the Proposed Project.

[217] Application, p. 7-35
[218] DNR Comment Letter
[219] Application, Section 7.7; DNR Comment letter, November 10, 2015, eDocket No. 201511-115613-01.

Table 19: Rare and Unique Species

Type	Common Name	Scientific Name	Number of Recorded Occurrences in Project Area	Federal Status	State Status
Bird	Upland Sandpiper	*Bartramia longicauda*	2	None	Watchlist
Bird	Yellow Rail	*Coturnicops noveboracensis*	3	None	Special Concern
Mussel	Creek Heelsplitter	*Lasmigona compressa*	1	None	Special Concern
Mussel	Black Sandshell	*Liumia recta*	1	None	Special Concern
Bat	Northern Long-Eared Bat	*Myotis septentrionalis*	---	Threatened	Special Concern

The Upland Sandpiper's preferred habitat is in grassland areas, while Yellow Rails are a wetland species.[220]

The Northern Long-Eared Bat (NLEB) is found throughout eastern and central North America.[221] The bats hibernate in caves and mines during winter months and roost in forested areas during summer months.[222]

The NLEB was listed by the USFWS as a threatened species on April 2, 2015. The primary reason for the listing is the rapid decline in NLEB populations due to white nose syndrome, a fungal disease that has quickly spread throughout the species' range.[223] Because of this disease, other possible causes of NLEB mortality may now be important factors affecting the viability of NLEB populations in the United States.[224] One such cause is the loss or degradation of summer roosting habitat. One identified roosting tree is identified within one-quarter mile of the Proposed Project.[225]

Potential Impacts

Impacts to rare and unique species due to the project are anticipated to be minimal, due to the location of the Proposed Project along existing road ROWs for the majority of the routes evaluated.

The Proposed Project will cross rivers and streams in the project area. If soil erosion resulting from the construction of the project is not minimized and mitigated, this erosion

220 DNR. , *Rare Species Guide,* http://www.dnr.state.mn.us/rsg/index.html
221 USFWS Endangered Species, Northern Long-Eared Bat, http://www.fws.gov/midwest/endangered/mammals/nlba/.
222 Id.
223 Id.
224 Id.
225 Application, Section 7.7.

could adversely affect water quality and thus the Creek Heelsplitter and Black Sandshell mussels.

One NLEB roosting location has been identified within one-quarter mile of the Proposed Project and it is likely that NLEB use additional trees in the area for roosting. Depending upon the route selected, the Proposed Project will impact between approximately 5.4 and 13.7 acres of forested habitat (Table 5). The removal of these trees could limit and degrade roosting habitat for the NLEB.

Mitigation

The primary and preferred means of mitigating impacts to rare and unique natural resources is to avoid them through prudent routing. Within a route, impacts can be mitigated by placing the alignment and specific structures away from rare resources or spanning vegetative resources, and by spanning waterways and wetlands to the extent possible. Impacts can also be mitigated by using existing, already disturbed, infrastructure rights-of-way to the extent possible.

Great River Energy's application identified the following mitigation measures it will implement to minimize impacts to rare natural resources:[226]

- Construction along road ROW to the extent possible.
- Minimizing tree and shrub removal.
- Spanning waterways.
- Utilizing BMPs to prevent soil erosion.
- Revegetating disturbed areas with native species and wildlife conservation species where applicable,

In addition to Great River Energy's proposed mitigation measures the DNR has recommended several mitigation strategies, including:[227]

- Confining construction activities to the opposite side of the road from identified Sites of Biodiversity to the extent possible and confining construction activities to existing road rights-of-way in areas where construction is not situated across the road.
- Constructing the project within already disturbed areas,
- Minimizing vehicular disturbance,
- Avoiding equipment or supply stockpiles in the area,
- Inspecting and cleaning all equipment to prevent introduction of invasive species,
- Conducting work under frozen ground conditions to the extent possible,
- Revegetating with native species and weed-free seed mixes, topsoils, and mulches.

[226] Id.
[227] Id.

The USFWS recommends minimizing the removal of trees that could be used as roosting habitat for the NLEB. Tree removal can be minimized by prudent routing – by selecting routes, alignments, and structure locations that minimize the number of trees that must be removed to accommodate the new 115 kV transmission line ROW and by conducting tree removal between January and April and avoiding tree clearing between April 1 and September 30.[228]

5.9 Cumulative Potential Effects

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

The Responsible Governmental Unit (RGU) determines what projects are "reasonably likely to occur."[229] When making this determination, the RGU considers "whether any applications for permits have been filed with any units of government or whether detailed plans and specifications have been prepared for the project, among other considerations.[230] A project need not be permitted to be reasonably likely to occur.

In this instance, permit applications have been filed with the Commission for two pipeline projects proposed to be constructed and operated in the environmentally relevant area:

- Enbridge filed an application for a pipeline routing permit with the Commission for the Line 3 Project on April 24, 2015. This Proposed Project is intended to provide electrical power to a pump station associated with the Line 3 Project.[231]
- On November 8, 2013, North Dakota Pipeline Company, LLC (NDPC) filed an application for a pipeline routing permit with the Commission for the Sandpiper Pipeline Project (Sandpiper Project).[232] As proposed by Enbridge, the Line 3 Project would share ROW with the Sandpiper Project in this location.

The Line 3 Project and the Sandpiper Project are currently being analyzed under separate regulatory processes, and will have independent environmental reviews. The decisions regarding these pipeline routing permits are not anticipated to occur in 2016. The Line 3

228 Application, Section 7.7
229 Minn. R. 4410.0200, subp. 11a.
230 Id.
231 The complete record regarding the application for the proposed Line 3 Project can be found on the Minnesota eDockets webpage: https://www.edockets.state.mn.us/EFiling/search.jsp ("15" for year, "137" for number). Select information on the proposed Line 3 Project can be found on the EERA webpage: mn.gov/commerce/energyfacilities/Docket.html?Id=34709.
232 The complete record regarding the application for the proposed Sandpiper Project can be found on the Minnesota eDockets webpage: https://www.edockets.state.mn.us/EFiling/search.jsp ("13" for year, "474" for number). Select information on the proposed Sandpiper Project can be found on the EERA webpage: http://mn.gov/commerce/energyfacilities/Docket.html?Id=33599.

Project and the Sandpiper Project may or may not be permitted. If permitted, they may be routed in locations other than the Enbridge or NDPC preferred route location.

The following sections analyses the cumulative potential effects of the Proposed Project and the proposed pipeline projects where potential effects coincide. EERA staff evaluates both the Line 3 Project and the Sandpiper Project even though the final determination on the need or route for the proposed pipeline projects is unknown. In making this evaluation, EERA staff is not indicating these projects will be built. Rather, EERA is indicating their *potential* to be permitted and constructed based on the guidance of Minnesota Rule 4410.0200.

The "environmentally relevant area" includes locations where the potential effects of the Proposed Project coincide with the potential effects of other projects to impact the elements studied in Section 5.3 through Section 5.8. In general, this area includes the land between the proposed Palisade Pump Station and County Road 3 (480th Street) (**Figure 9**).

5.9.1 Proposed Pipeline Projects

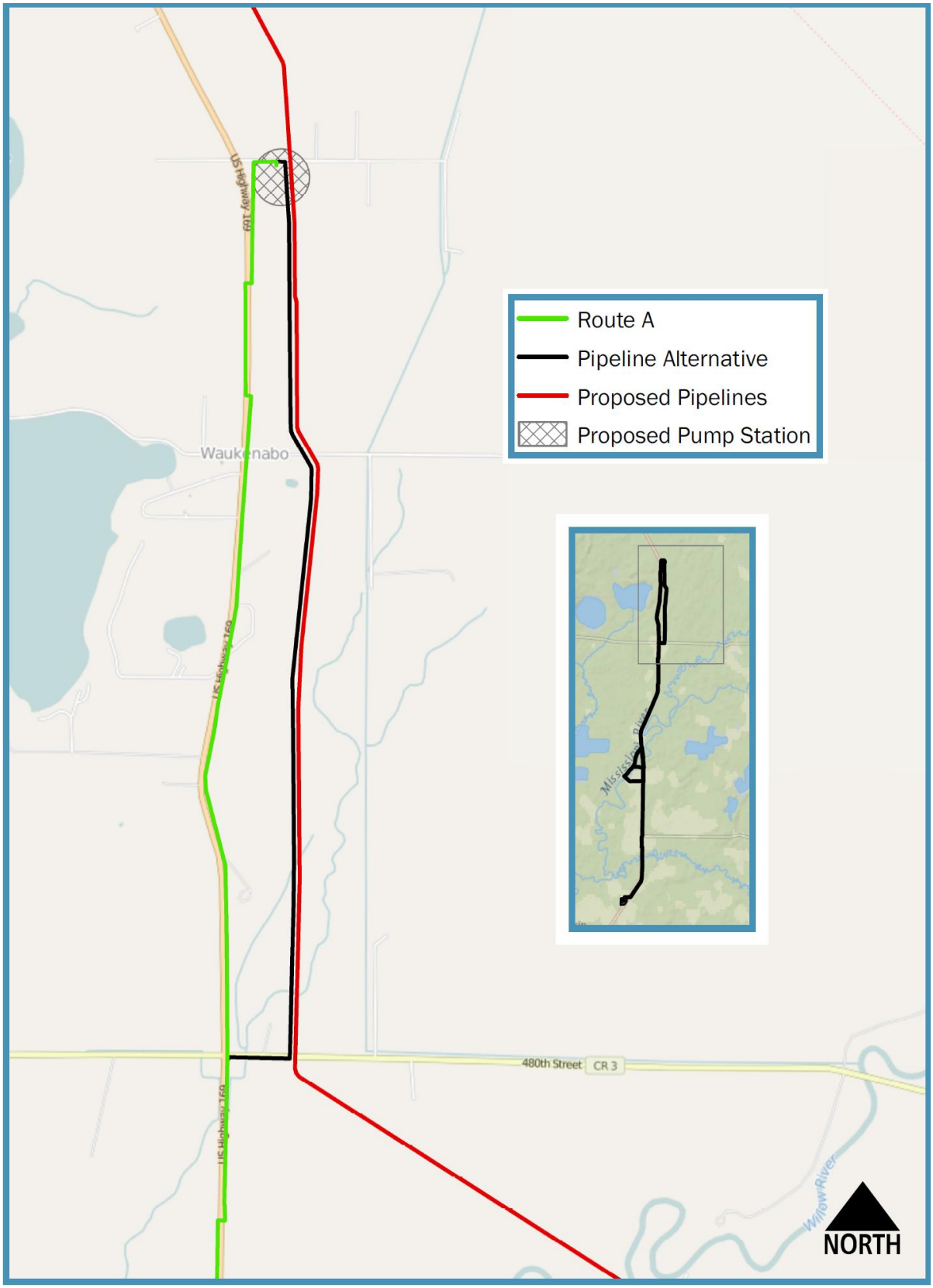
The purpose of the Proposed Project is to provide electrical power to the proposed Palisade Pump Station associated with the Line 3 Project. The Proposed Project will not be needed unless the Line 3 Project is permitted and constructed along Enbridge's preferred route and the proposed pump station is also permitted as an associated facility at Enbridge's preferred location. As a result, the Proposed Project is a connected action to the Line 3 Project.[233]

Enbridge's preferred route for the Line 3 Project is co-located within the proposed Sandpiper ROW in the area east of Clearwater, Minnesota, which includes the Proposed Project.[234] The proximity of the Proposed Project to the pipeline projects depends upon the route selected. **Figure 9** illustrates the relative locations of the Proposed Project, the Line 3 Project, and the Sandpiper Project.

[233] The opposite is not the case. For example, should the Line 3 Project be permitted but routed in a different location the pipeline will be built; however, the Proposed Project will not. Therefore, this EA studies the Proposed Project as a unique proposal; it does not analyze the potential impacts and possible mitigation measures associated solely with the pipelines.

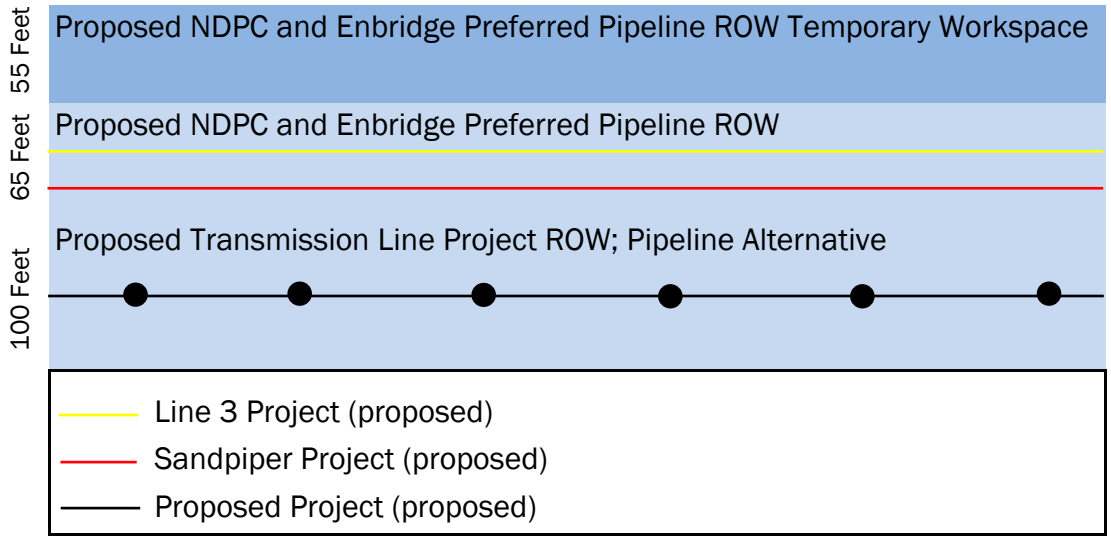
[234] Enbridge indicates the preferred route for the Line 3 Project is not dependent upon the approval and construction of the Sandpiper Project. See Minnesota Department of Commerce (May 12, 2015) Comments and Recommendations on Line 3 Application Completeness, : http://mn.gov/commerce/energyfacilities/Docket.html?Id=34079.

Figure 9: Proposed Project and Proposed Pipeline Overview



If the Proposed Project is constructed along the Pipeline Alternative (Route Segment I), the Proposed Project, the Line 3 Project, and the Sandpiper Project would share a corridor (**Figure 10**) between the proposed Palisade Pump Station and County Road 3. This corridor would be 220 feet across during the construction of the projects and 165 feet once all projects become operational.

Figure 10: Existing and Proposed Rights-of-Way and Temporary Workspace



*Not to scale.

If the Proposed Project is constructed along US Highway 169, the Proposed Project would be located approximately 800 to 1,600 feet west of the pipeline projects, with overlap between the Proposed Project and the Line 3 Project at the location of the Palisade Pump Station. In this case, construction of the Proposed Project would occur within a different corridor from the pipeline projects and the ROW for the Proposed Project would be parallel to, separate from that of the pipeline projects.

5.9.2 Analysis Assumptions

The following assumptions regarding the construction and normal operation of the proposed Sandpiper and Line 3 projects were used for the purposes of completing this cumulative potential effects analysis

Proposed Sandpiper Project

- A permit is issued for the Sandpiper Project to be constructed along NDPC's preferred route.
- The Sandpiper Project is constructed before the Line 3 Project in the environmentally relevant area. Construction may or may not occur during the same season as the Proposed Project or the Line 3 Project.

- Up to 120-feet of temporary workspace will be cleared of vegetation, including tree removal, and graded.
- Both the temporary work space and the ROW will be revegetated with native seed mixes. The ROW will be revegetated with low growing vegetation.
- Construction and operation of the Sandpiper Project will not preclude continued agricultural use within the pipeline ROW.

Line 3 Project

- A permit is issued for the Line 3 Project to be constructed along Enbridge's preferred route, which shares ROW with the Sandpiper Project in this location.
- The proposed Palisade Pump Station, which includes the proposed substation, is permitted and constructed as part of the Line 3 Project.
- The Sandpiper Project ROW and temporary workspace will be used; therefore, further clearing of vegetation is not anticipated beyond that required for the Palisade Pump Station.[235]
- Construction of the Line 3 Project may or may not occur during the same season as the proposed transmission line project or the Sandpiper Project in the environmentally relevant area.

Additionally, this analysis assumes the Line 3 and Sandpiper Projects will be in operation for 50 years. These pipeline projects could be in operation beyond that time. Upon reaching the end of their operational life, it is assumed pipelines and associated infrastructure will remain in place and the ROWs will continue to be maintained.

For the purposes of this EA, actions that have occurred in the past and their associated impacts are considered part of the existing environment and are included in the affected environment described in Section 5 and the analysis conducted in Sections 5.3 through 5.8

The ROI for cumulative potential effects varies across elements and includes the Proposed Project, the Line 3 Project, and the Sandpiper Project, and is consistent with the ROI identified in Section 5.0. For example, the ROI for vegetation is limited to the ROW for the Proposed Project and the ROWs for the proposed pipeline projects within the environmentally relevant area, while the ROI for recreation and tourism is an area within one mile of the Proposed Project and proposed pipeline projects.

Cumulative potential effects—where they coincide—increase the breadth of the impact to the elements studied in Sections 5.3 through 5.8. This may or may not change the impact intensity level assigned to the element in Sections 5.3 through 5.8.

Where cumulative effects are anticipated, a written description is provided. Where cumulative potential effects are not anticipated, no further analysis is provided.

[235] See Enbridge Energy, Limited Partnership (April 2015) Route Permit Application for the Minnesota Public Utilities Commission, eDockets Nos. 20154-109660 to 20154-109663, page 5-5, Appendices G and N.

The following graphics are used to illustrate cumulative potential effects:

- Cumulative potential effects are anticipated.
- Cumulative potential effects are NOT anticipated.
- Cumulative potential effects are uncertain.

5.9.3 Human Settlement

This section illustrates and describes cumulative potential effects to the human settlement resources discussed in Section 5.3.

Table 20: Cumulative Potential Effects – Human Settlement

Element / Resource	Region of Influence	US Highway 169			Pipeline Alternative		
		Short-term	Long-term	Permanent	Short-term	Long-term	Permanent
Aesthetics	400 Feet	✚	✚	✚	✚	✚	✚
Cultural Values	Aitkin County	◆	◆	◆	◆	◆	◆
Displacement	ROW	◆	◆	◆	◆	◆	◆
Interference	Route Width	◆	◆	◆	◆	◆	◆
Land Use	ROW	✚	✚	✚	✚	✚	✚
Noise	400 Feet	✚	✚	✚	✚	✚	✚
Property Values	400 Feet	◆	◆	◆	✚	▼	▼
Socioeconomics	Aitkin County	✚	✚	◆	✚	✚	◆

Aesthetics

The ROI for aesthetics resources is 400 feet.

Short-term temporary workspace will be needed during construction of the proposed pipeline projects. If the Proposed Project is located along the pipeline alternative, then co-location of the Proposed Project with the proposed pipeline projects will expand the existing pipeline corridor by 100 feet, for a combined corridor width of 220 feet. Construction of the Proposed Project would require would require clearing of some forested areas and the addition of transmission structures adjacent to the cleared pipeline ROW. If the Proposed Project were constructed adjacent to the pipelines the result would be a permanent cleared ROW of approximately 165 feet.

If the Proposed Project were constructed along US Highway 169, the pipeline ROW would remain approximately 120 feet during construction and 65 feet once operational, while a

separate ROW would expand the existing cleared ROW along the highway by up to 100 feet in a corridor approximately 800 to 1,600 feet west of the pipeline corridor.

Regardless of the route selected for the Proposed Project, the developed area for both the Proposed Project and the pipeline ROW would include the Palisade Pump Station on a site of approximately 7.8 acres on the south side of 510th Lane. The fenced portion of the pump station would include equipment ranging in height between 18 and 61 feet, with an antenna of 199 feet.[236]

Cumulative potential effects along all route alternatives are anticipated to remain moderate.

Land Use and Zoning

The ROI for land use and zoning is the ROW. Construction of the Proposed Project along the pipeline alternative will increase the width of the construction corridor in the short-term, and result in a wider single cleared corridor in the long-term.

Construction of the Proposed Project along US Highway 169 would result in two separate corridors located approximately 800 to 1,600 feet apart.

In the long-term construction of the Proposed Project and proposed pipeline projects will increase the number of easements, encumbering future land uses along the respective ROWs for the long-term. Depending upon the route selected, the easements may be on the same parcels or different parcels.

Cumulative potential effects along all route alternatives are anticipated to remain minimal.

Noise

The ROI for noise impacts is 400 feet. Construction of the Proposed Project and proposed pipeline projects will increase noise impacts during construction of each project. Should construction schedules coincide, noise impacts will be additive. Long-term noise impacts from operation of the proposed Palisade Pump Station include a pump station are anticipated to increase ambient noise levels at residences nearest the proposed pump station location by between 0.5 and 0.9 dB, for a total estimated sound level of 41.4 – 41.5 dBA.[237]

Cumulative potential effects along all routing options are anticipated to remain minimal.

Property Values

The ROI for potential impacts to property values is 400 feet. Based on the literature, co-location of the Proposed Project and proposed pipeline projects may negatively impact

[236] Department of Commerce. *Line 3 Scoping EAW* (hereinafter *Line 3 EAW*), Table 6b-7. http://mn.gov/commerce/energyfacilities/documents/34079/L3R_EAW_Master_Text_Clean_2016-04-08v2_REDUCED_Part1.pdf

[237] *Line 3 EAW*, at p. 160.

property values over the short-term. Any change to a specific property's value is difficult to determine. Long-term impacts may or may not occur.

Cumulative potential effects to property values are not anticipated if the Proposed Project is routed along US Highway 169.

Cultural Values, Displacement, and Interference

Construction of the Proposed Project and the proposed pipelines are not expected to create cumulative potential effects related to cultural values, displacement, or interference.

Socioeconomics

The ROI for socioeconomics is Aitkin County. To the extent workers for any or all of the proposed projects are hired locally, construction wages and salaries in Aitkin County will increase. Expenditures will increase over the short-term at local businesses. Over the long-term, Aitkin County will receive tax revenue associated with the pipeline projects.

Cumulative potential effects for all route alternatives are anticipated to remain positive and minimal.

5.9.4 Public Health and Safety

This section illustrates cumulative potential effects to human health and safety discussed in Section 5.4. No cumulative potential effects for public health and safety are anticipated regardless of the route selected.

5.9.5 Public Services

This section illustrates and describes cumulative potential effects to the public services discussed in Section 5.5.

Table 21: Cumulative Potential Effects – Public Services

Element / Resource	Region of Influence	US Highway 169 and Pipeline Route Alternatives		
		Short-term	Long-term	Permanent
Airports	Aitkin County	◆	◆	◆
Emergency Services	One Mile	✚	◆	◆
Roads and Highways	One Mile	✚	◆	◆
Utilities	One Mile	◆	◆	◆

Emergency Services

The ROI for emergency services is one mile. Construction of the Proposed Project and proposed pipeline projects may increase delays to emergency vehicles regardless of the route selected for the Proposed Project. Long-term impacts are not anticipated.

Cumulative potential effects along all route alternatives are anticipated to remain minimal.

Roads and Highways

The ROI for roads and highways is one mile. Regardless of the route selected, construction of the Proposed Project and proposed pipeline projects may increase traffic delays along US Highway 169. Long-term impacts are not anticipated.

Although no new roads would be constructed for either the Proposed Project or the pipeline projects, Enbridge anticipates widening 510th Lane in the vicinity of the Palisade Pump Station.[238]

Cumulative potential effects along all route alternatives are anticipated to remain minimal.

Airports and Utilities

No cumulative potential effects to airports or utilities are anticipated.

5.9.6 Land-Based Economies

This section illustrates and describes cumulative potential effects to the land-based economies discussed in Section 5.6.

Table 22: Cumulative Potential Effects – Land-Based Economies

Element / Resource	Region of Influence	US Highway 169 Route Alternative			Pipeline Route Alternative		
		Short-term	Long-term	Permanent	Short-term	Long-term	Permanent
Agriculture	ROW	✚	✚	✚	✚	✚	✚
Forestry	ROW	◆	◆	◆	✚	✚	✚
Mining	ROW	◆	◆	◆	◆	◆	◆
Recreation and Tourism	Project Area	◆	◆	◆	◆	◆	◆

Agriculture

The ROI for agriculture is the ROW. Regardless of whether the Proposed Project is constructed along US Highway 169 or along the Pipeline Alternative, construction of the proposed Palisade Pump Station will permanently decrease the amount of land available for agricultural uses.

Cumulative potential effects along all route alternatives are anticipated to remain minimal,

238 *Line 3 EAW*, p. 166

Forestry

The ROI for forestry is the ROW. Construction and co-location of the Proposed Project and proposed pipeline projects will decrease the number of acres available for forestry operations, such as timber harvest. Cumulative potential effects will be long-term. Within a regional context, cumulative potential effects to forestry are anticipated to remain minimal if the Proposed Project is constructed along the Pipeline Alternative.

Cumulative potential effects are not anticipated if the Proposed Project is routed along US Highway 169.

Mining, Recreation and Tourism

Construction of the Proposed Project and the proposed pipelines is not expected to create cumulative potential effects related to mining or to recreation and tourism.

5.9.7 Archeological and Historic Resources

This section illustrates and describes cumulative potential effects to the archeological and historical resources discussed in Section 5.7.

The ROI for archeological and historic resources is one-mile. Cumulative potential effects to archeological and historic resources are not anticipated. However, previously undiscovered resources may be encountered.

Table 23: Cumulative Potential Effects – Archeological and Historic Resources

Element / Resource	Region of Influence	US Highway 169 and Pipeline Route Alternatives		
		Short-term	Long-term	Permanent
Archeological Features	One-mile	▼	▼	▼
Historic Features	One-mile	▼	▼	▼

5.9.8 Natural Resources

This section illustrates and describes cumulative potential effects to the natural resources discussed in Section 5.8.

Table 24: Cumulative Potential Effects – Natural Resources

Element / Resource	Region of Influence	US Highway 169 Route Alternative			Pipeline Route Alternative		
		Short-term	Long-term	Permanent	Short-term	Long-term	Permanent
Air Quality	Aitkin County	✚	✚	◆	✚	◆	◆
Geology	ROW	◆	◆	◆	◆	◆	◆
Groundwater	Route Width	◆	◆	◆	◆	◆	◆
Rare and Unique Resources	One-mile	◆	◆	◆	◆	◆	◆
Soils	ROW	◆	◆	◆	✚	◆	◆
Surface Water	ROW	◆	◆	◆	✚	◆	◆
Vegetation	ROW	◆	◆	◆	✚	✚	✚
Wetlands	ROW	◆	◆	◆	✚	✚	✚
Wildlife	ROW	◆	◆	◆	✚	◆	◆

Air Quality

The ROI for air resources is Aitkin County. Construction of the proposed project and the pipeline projects will increase fugitive dust and emissions. In the long term, the Palisade Pump Station will produce approximately 1.16 tons of VOCs per year, and would be classified as a minor source under federal Prevention of Significant Deterioration ("PSD") regulations in 40 CFR 52.21.[239]

Cumulative potential effects along all route alternatives are anticipated to remain minimal.

Geology, Groundwater, and Rare and Unique Resources

Cumulative potential effects to geology, groundwater, and rare and unique resources are not anticipated from construction of the Proposed Project and the proposed pipelines.

Soils

The ROI for soils is the ROW. Construction of the Proposed Project along the Pipeline Alternative would be expected to increase short-term impacts to soils through compaction, grading, and the likelihood for soil erosion along a corridor of up to 220 feet.

Cumulative potential effects to soils are not expected if the Proposed Project is constructed along US Highway 169.

Long-term cumulative potential effects are not anticipated with implementation of proper BMPs. Cumulative potential effects are anticipated to remain minimal.

[239] *Line 3 EAW*, p. 154

Surface Water

The ROI for surface water is the ROW. Construction of the Proposed Project along the Pipeline Alternative may increase potential for soil runoff within the consolidated transmission and pipeline corridor of up to 220 feet. Long-term impacts are not anticipated. Cumulative potential effects are anticipated to remain minimal.

Cumulative potential effects to surface waters are not expected if the Proposed Project is constructed along US Highway 169.

Vegetation

The ROI for vegetation is the ROW. Construction of the Proposed Project along the pipeline alternative will increase vegetative clearing and restrict revegetation of certain vegetation types within a corridor of up to 220 feet. Cumulative potential effects are anticipated to remain moderate along the pipeline alternative.

Construction of the Proposed Project along US Highway 169 would not affect vegetation along the pipeline project corridor, but would expand clearing along the highway by up to 100 feet. Cumulative potential effects to vegetation are not anticipated if the Proposed Project is routed along US Highway 169.

Wetlands

The ROI for wetlands is the ROW. Construction and co-location of the Proposed Project and the two pipeline projects will increase effects to wetlands through type conversion, increased sedimentation and runoff resulting in higher levels of turbidity, and possible wetland loss. Impacts will be long-term due the nature of wetland soils. Cumulative potential effects are anticipated to remain moderate.

Although construction of the Proposed Project along US Highway 169 is anticipated to result in moderate impacts to wetlands, no cumulative potential effects with construction of the proposed pipelines is anticipated, as the construction activities would occur in two corridors, separated by more than 1000 feet.

Wildlife

The ROI for wildlife is the route width. Construction and co-location of the proposed project and the pipeline projects has the potential to increase short- -term displacement of wildlife as a result of the construction corridor of up to 220 feet. Long-term impacts are not anticipated. Cumulative potential effects are anticipated to remain minimal.

Cumulative potential effects to wildlife are not expected if the Proposed Project is constructed along US Highway 169.

6 Unavoidable Impacts

Transmission lines are infrastructure projects that have unavoidable adverse human and environmental impacts. These potential impacts and the possible ways to mitigate against them are discussed in Section 5. However, even with mitigation strategies, certain impacts cannot be avoided.

6.1 Unavoidable Impacts

Unavoidable adverse impacts associated with construction of the Proposed Project include:

- Possible traffic delays.
- Visual and noise disturbance to nearby residents and recreationalists.
- Soil compaction and erosion.
- Vegetative clearing, including forested areas and woody wetlands.
- Disturbance and displacement of wildlife, as well as direct impacts to wildlife inadvertently struck or crushed during pole placement or other activities.

Unavoidable adverse impacts associated with the operation of the Proposed Project include:

- Visual impact of transmission line structures, conductors, and breaker station.
- Loss of land use for other purposes, such as forestry, where structures are placed.
- Direct impacts to avian species that collide with conductors.
- Potential decrease in neighboring property values.
- Continued maintenance of tall-growing vegetation, that is, continued cutting of trees.

6.2 Resource Commitments

Resource commitments are irreversible when it is impossible or very difficult to redirect that resource to a different future use. Irreversible impacts include the land required to construct the transmission line. While it is possible that the structures and conductors could be removed and the ROW restored to previous conditions, this is unlikely to happen in the reasonably foreseeable future. The loss of forested wetlands is considered irreversible, because replacing these wetlands would take a significant amount of time. Certain land uses within the ROW will no longer be able to occur. Impacts to native plant communities would result in an irreversible impact.

An irretrievable commitment of resources means the resource is not recoverable for later use by future generations. These impacts are primarily related to project construction, including the use of aggregate, hydrocarbons, steel, and concrete resources committed to

the Proposed Project. The commitment of labor and fiscal resources is also considered irretrievable.

7 Comparative Analysis of Route Alternatives

The analysis in Section 7 applies the information and data available in the route permit application and the EA to the factors the Commission must consider when making a permit decision.

The Minnesota Legislature directed the Commission to select HVTL routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity.[240] An HVTL route must be compatible with environmental preservation and the efficient use of resources while also insuring electric energy needs are met and fulfilled in an orderly and timely fashion.[241]

Minnesota Statute 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must take into account when designating a route for a HVTL. These considerations are further clarified and expanded by Minnesota Rule 7850.4100, which identifies 14 factors the Commission must consider when making a permit decision. These factors are outlined in Section 2.5 of this document.

The analysis applies the routing factors to the Proposed Project, and discusses the relative merits of the route alternatives. Graphics are used to illustrate the various impacts across the route alternative (**Table 25**). Where impacts are anticipated to be minimal across all route alternatives, no graphic is provided.

Table 25: Guide to Routing Factors

Anticipated Impact or Consistency with Routing Factor	Symbol
▪ Impacts are anticipated to be minimal with the application of best management practices (BMPs) and general route permit conditions OR ▪ Routing option is consistent with routing factor.	
▪ Impacts are anticipated to be minimal to moderate with the application of BMPs and general route permit conditions, and may require special conditions or selection of a specific routing option to mitigate, OR ▪ Routing option might be minimal but the potential for impacts greater than the other options, OR ▪ Routing option is consistent with routing factor but less so than other options in this area.	
▪ Impacts are anticipated to be moderate or significant and unable to be mitigated, OR ▪ Routing option is not consistent with routing factor or consistent only in part.	

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

With respect to Factor G, it is assumed that all routing options maximize energy efficiencies and accommodating expansion of transmission capacity. Impacts associated with adverse environmental effects are discussed as a part of Factor E Effects on Natural Resources.

Factor I (use of existing large electric power generating plant sites) is not applicable.

With respect to Factor J (use of existing transportation, pipeline, electrical transmission systems or ROW), the Proposed Project will parallel existing electrical transmission ROW; however, it will not share or specifically use, that is, be located within, existing ROW.

With respect to Factor K, it is assumed that all routing alternatives are reliable.

Factor M (unavoidable impacts) and Factor N (irreversible and irretrievable commitments of resources) are discussed in Section 6.

7.1 Effects on Human Settlement

Potential impacts and possible mitigation measures are discussed in Section 5.3.

Table 26: Effects on Human Settlement

Element	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Aesthetics	▲	▲	▲	▲	▲	▲
Displacement	▲	▲	▲	▲	▲	▲
Recreation	●	▲	▲	●	▲	▲
Electronic Interference	●	●	●	●	●	●
Noise	●	●	●	●	●	●
Land Use	●	●	●	●	●	●
Property Values	●	●	●	●	●	●

Aesthetics

Impacts along all route alternatives are anticipated to be moderate with the use of standard construction techniques, BMPs, and general permit conditions.

Displacement

Displacement of a residence is possible, but considered unlikely along all route alternatives evaluated.

Preliminary analysis indicates that one home and one additional structure are within the anticipated ROW. The location of these structures is common to all routes evaluated.

Great River has expressed confidence that engineering modifications or a reduction in easement width could be employed to avoid displacement of any homes and it is anticipated that the Proposed Project would not require the displacement of any homes.

Recreation

Impacts along Route Alternative A are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions. Impacts along route alternatives B and C are anticipated to be minimal to moderate, but greater than Route Alternative A, as alternatives B and parallel a more rural section of the Great River Road than Route Alternative A.

Electronic Interference, Land Use and Zoning, Noise, Property Values

For all route alternatives impacts related to these elements are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions.

Cultural Values, Socioeconomics

Impacts related to these elements are not anticipated.

7.2 Effects on Public Safety

Potential impacts and possible mitigation measures are discussed in Section 5.4.

Electronic and Magnetic Fields, Implantable Medical Devices, Stray Voltage

Impacts related to these elements are anticipated to be minimal for all route alternatives with the use of standard construction techniques, BMPs, and general permit conditions.

7.3 Effects on Land-Based Economies

Potential impacts and possible mitigation measures are discussed in Section 5.6.

Agriculture, Forestry

Impacts related to these elements are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions.

Recreation and Tourism

Impacts along Route Alternative A, and its associated pipeline alternative, are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions. Impacts along route alternatives B and C, and their associated pipeline alternatives, are anticipated to be minimal to moderate, but greater than Route Alternative A, as alternatives B and parallel a more rural section of the Great River Road than Route Alternative A.

Mining

Impacts related to mining are not anticipated.

Table 27: Effects on Land-Based Economies

Element	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Agriculture	●	●	●	●	●	●
Forestry	▲	▲	▲	▲	▲	▲
Recreation & Tourism	●	▲	▲	●	▲	▲

7.4 Effects on Archaeological and Historic Resources

Potential impacts to archaeological and historic resources and possible mitigation measures are discussed in Section 5.7.

For all routing options impacts related to archaeological and historic resources are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions.

7.5 Effects on Natural Resources

Potential impacts to natural resources and possible mitigation measures are discussed in Section 5.8.

Air Quality, Groundwater, Soils, Surface Water

For all route alternatives impacts related to these elements are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions.

Geology

Impacts related to this element are not anticipated.

Wetlands

Depending on the route selected, there are between approximately 17 and 36 acres of wetlands within the anticipated ROW for the project. Wetlands along the routes evaluated are predominantly comprised of scrub-shrub and forested wetlands. Forested wetlands are more heavily represented along the route alternatives that would follow the Pipeline Alternative (Route Segment I)

Given the prevalence of wetlands along the route alternatives evaluated, it is unlikely that all wetlands can be spanned. Permanent impacts to wetlands would occur where structures are located within wetland boundaries, and are estimated to be approximately 20 square feet per structure. Forested wetlands within the transmission line ROW would likely undergo a permanent change of vegetation type as a result of the Proposed Project.

Vegetation

Depending upon the route selected, approximately 5.4 to 13.7 acres of trees would be removed. This would result in a permanent change in vegetation in these areas, replacing the trees with lower-growing species.

Wildlife

After mitigation is employed wildlife impacts for all route alternatives are anticipated to be minimal.

Table 28: Effects on Natural Resources

Element	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Vegetation	▲	▲	▲	▲	▲	▲
Wetlands	●	●	●	▲	▲	▲
Wildlife	●	●	●	●	●	●

7.6 Effects on Rare and Unique Resources

Potential impacts to rare and unique resources and possible mitigation measures are discussed in Section 5.8.10.

For all routing options impacts related to these elements are anticipated to be minimal with the use of standard construction techniques, BMPs, and general permit conditions.

7.7 Paralleling of Existing Rights-of-Way

The use of existing ROWs is discussed in Section 3.5. As shown in **Table 15**, all routes evaluated parallel roadways for the majority of their length (between 76 and 100 percent); the majority of the route length for all routes is along US Highway 169.

Route alternatives B and C, and their associated pipeline alternatives, both travel cross country for approximately 0.3 miles, or approximately two percent of their route lengths. Routes along the pipeline alternative would parallel the proposed Sandpiper and Line 3 pipelines for approximately 3.1 miles, or approximately 22 to 24 percent of their route lengths.

With respect to compliance with Minn. Stat. 216E.03, subd. 7 (b)(12)(e), which requires the Commission to consider following existing road or transmission line ROW and do not address other existing or planned types of ROW, route alternatives A, B, and C are most consistent with the directive.

Table 29: Paralleling Existing Rights-of-Way

Element	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Parallel Road or Existing HVTL	●	●	●	▲	▲	▲

7.8 Design Dependent Costs

Costs for the Proposed Project are discussed in Section 3.9. The cost differential between route alternatives are related to route length – all route alternatives would include costs related to the breaker station. Great River Energy anticipates construction costs of $498,000 per mile when single pole structures are used and $550,000 for portions using H-frame structures. Assuming use of single pole structures for all routes evaluated, construction costs for the transmission line portion of the Proposed Project are estimated at between $6.42 and $7.02 million (**Table 30**).

Table 30: Design-Dependent Costs

Element	Route A	Route B	Route C	Route A/ Pipeline	Route B/ Pipeline	Route C/ Pipeline
Route Length	12.9	13.8	13.5	13.2	14.1	13.8
Construction Cost $ million (Transmission Line only)	$6.42	$6.87	$6.72	$6.57	$7.02	$6.87