



Environmental Assessment Menahga Area 115 kV Transmission Line Project

In the Matter of the Application of Great River Energy and Minnesota Power for a Certificate of Need and a Route Permit for the Menahga Area 115 kV Transmission Line Project in Hubbard, Wadena and Becker Counties, Minnesota

Docket Nos. ET2, E015/CN-14-787 and ET2, E015/TL-14-797



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Abstract

On January 15, 2015, Great River Energy and Minnesota Power (applicants) filed a joint certificate of need and route permit application with the Minnesota Public Utilities Commission (Commission) for the Menahga Area 115 kilovolt (kV) transmission line project. The applicants indicate in their application that the project is needed to relieve overloads on the existing 34.5 kV transmission system near the city of Menahga, Minn., and to serve a proposed, new oil pumping station in the area.

The applicants propose to construct approximately 22.5 miles of new 115 kV transmission line and associated facilities in the Minnesota counties of Hubbard, Wadena, and Becker. The project includes three new substations and modifications to existing substations.

Two separate approvals from the Commission are required for the construction of the project – a certificate of need (CN) and a route permit. Department of Commerce, Energy Environmental Review and Analysis (EERA) staff is responsible for conducting environmental review for CN and route permit applications submitted to the Commission. As two concurrent environmental reviews are required – one for the CN and one for the route permit – the Department has elected to combine these reviews in one document. Thus, this environmental assessment (EA) has been prepared to meet the requirements of both review processes.

This EA addresses the issues required in Minnesota Rules 7849.1500 and 7850.3700 and those identified in the Department's scoping decision of May 26, 2015.

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 from the Office of Administrative Hearings. Upon completion of the environmental review and hearing process, the record compiled on the joint certificate of need and route permit application will be presented to the Commission for final decisions. Commission decisions on the joint application are anticipated by early 2016.

Persons interested in this project can place their names on the project mailing list by contacting Tracy Smetana, the Commission's public advisor, by email: consumer.puc@state.mn.us, or by phone: 651-296-0406 (toll free: 1-800-657-3782). Documents of interest for this project can be found on the State of Minnesota's eDockets system: <https://www.edockets.state.mn.us/EFiling/search.jsp>. Enter the year

“12” and the number “787” (for the CN docket) or “797” (for the route permit docket). Documents of interest can also be found on the Department’s website at: www.mn.gov/commerce/energyfacilities/Docket.html?Id=33985.

List of Preparers

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Acronyms, Abbreviations, and Definitions

ACSR	Aluminum Core Steel Reinforced
ALJ	Administrative Law Judge
Commission	Minnesota Public Utilities Commission
CN	Certificate of Need
CSAH	County State Aid Highway
dB	Decibels
dBA	A-weighted Sound Level Recorded in Decibels
DC	Direct Current
DNR	Minnesota Department of Natural Resources
Department	Minnesota Department of Commerce
EA	Environmental Assessment
EERA	Department of Commerce Energy Environmental Review and Analysis
EMF	Electromagnetic Field
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
HVTL	High Voltage Transmission Line
Hz	Hertz
kV	Kilovolt
kV/M	Kilovolt per Meter
mA	milliAmperes
mG	milliGauss
MHz	Megahertz
MnDOT	Minnesota Department of Transportation
MnGEO	Minnesota Geospatial Information Office
MPCA	Minnesota Pollution Control Agency
MPL	Minnesota Pipeline Company
MSIWG	Minnesota State Interagency Working Group
MVA	Megavolt Amperes
MW	Megawatt
NAC	Noise Area Classification
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NIEHS	National Institute of Environmental Health Sciences
NLEB	Northern Long-Eared Bat
NPDES	National Pollutant Discharge Elimination System
ppm	Parts per Million
ROW	Right-of-Way
SHPO	State Historic Preservation Office
USACE	United States Army Corp of Engineers
USFWS	United States Fish and Wildlife Service
WCA	Minnesota Wetland Conservation Act
WMA	Wildlife Management Area

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Summary

Great River Energy and Minnesota Power (applicants) propose to construct approximately 22.5 miles of new 115 kV transmission line in central Minnesota in the counties of Hubbard, Wadena, and Becker. The transmission line would proceed from the existing Hubbard substation westward to a new Straight River substation, and then southward to a new Blueberry substation near the city of Menahga and to a new Red Eye substation. The project is proposed to include a short section of double-circuit 115 kV line, from the existing Hubbard substation to County Road 115, relocation of the existing Menahga substation to the new Blueberry substation, and modifications to the existing Hubbard and Pipeline substations.

In order to construct the proposed transmission line, the applicants must obtain two approvals from the Minnesota Public Utilities Commission (Commission) – a certificate of need (CN) and a route permit. The Commission’s docket numbers for these approvals are ET2, E015/TL-14-787 and ET2, E015/TL-14-797. In addition to these approvals from the Commission, the project will require approvals (e.g., permits, licenses) from other state agencies, federal agencies, and local units of government.

With the applicants’ joint CN and route permit application, the Commission has two considerations before it – (1) whether the project is needed, or whether some other project would be more appropriate for the State of Minnesota, and (2) if the project is needed, where it is best located. To aid the Commission in these considerations, the Commission gets assistance from several state agencies, including the Department of Commerce (Department) and the Office of Administrative Hearings (OAH).

Department Energy Environmental Review and Analysis (EERA) staff is responsible for conducting environmental review for CN and route permit applications submitted to the Commission. The intent of this review is to ensure that citizens, local governments, agencies, and the Commission are aware of the potential human and environmental impacts of the project and that the Commission can consider these impacts when determining whether the project is needed and where it should be located.

State Review Process

EERA staff has prepared this environmental assessment (EA) for the Commission and for other agencies and entities that have permitting authority related to the project. This EA is also intended to assist citizens in providing guidance to the Commission and other decision-makers regarding the project. This EA evaluates the potential human and environmental impacts of the applicants’ proposed project and possible mitigation measures, including route and site alternatives. It also evaluates potential alternatives to the project itself.

The EA does not advocate or state a preference for a specific route or site alternative, or for an alternative to the project itself. The EA analyzes and compares potential impacts and mitigation measures, including routes and site alternatives, such that citizens, local governments, agencies, and the Commission can work from a common set of facts.

EERA staff initiated work on this EA by soliciting comments on (1) the issues and impacts that should be evaluated in the EA, (2) the mitigation measures to study, including route alternatives, and (3) alternatives to the project itself that should be studied. This process of soliciting comments on the contents of the EA is known as “scoping.” EERA solicited comments through a public meeting in March 2015 and a public comment period that ended April 10, 2015.

Based on the scoping comments received, the Department issued the scoping decision for this EA on May 26, 2015. The scoping decision includes five route alternatives and a substation site alternative that are evaluated in this EA. All of the alternatives are analyzed in this EA with same level of detail and analysis, and evaluated against the routing factors of Minnesota Rule 7850.4100.

After issuance of this EA, an administrative law judge (ALJ) will hold a public hearing for the project. The hearing will be held in the project area. Interested persons will have an opportunity at the hearing to ask questions, provide comments, submit evidence, and advocate for the routes and sites that they believe are most appropriate for the project. The ALJ will submit a report to the Commission. Based on the ALJ's report, the EA, and the entire record, the Commission will decide whether to grant a CN and route permit for the project.

Project Need and System Alternatives

The applicants indicate that the proposed project is needed to: (1) relieve potential overloads on the existing 34.5 kV transmission system in the project area, particularly overloads related to the largest electrical load in the area, the city of Menahga, and (2) to serve a proposed, new Minnesota Pipeline Company oil pumping station just north of the city of Sebeka in Red Eye Township, Wadena County.

The system alternatives examined in this EA are those noted in Minnesota Rule 7849.1500. Of these, a transmission line with different endpoints is the only alternative that is feasible and available and that could meet the stated need for the project. This alternative (Orton Tap alternative) would tap the existing Badoura – Dog Lake 115 kV line in Cass County, proceed westward to a new substation in Orton Township, Wadena County, and continue on to the Red Eye substation. This alternative would have human and environmental impacts similar to the proposed project. However, based on analysis by the applicants, this alternative is less effective in meeting the need for the project than the applicants' proposed project.

Potential Impacts of 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 – and by design and construction measures.

Impacts to human settlements as a result of the project are anticipated to be minimal. Aesthetic impacts due to the project are unavoidable, but are anticipated to be minimal. The project has the potential to impact the Alajoki Cemetery, but these impacts can be minimized by prudent pole placement. Impacts to public health and safety and to public services are anticipated to be minimal. Impacts to known archaeological and historic resources are anticipated to be minimal. However, there is potential to impact unknown archaeological resources during construction of the project.

Impacts to land-based economies are anticipated to be minimal; however, impacts to trees and forestry are anticipated to be moderate. Impacts to trees are unavoidable, as the project area includes substantial amounts of forest. Impacts to trees can be minimized by prudent placement of the transmission line alignment and poles, particularly through right-of-way sharing with existing infrastructure.

Impacts to water resources and soils are anticipated to be minimal; such impacts can be mitigated by construction best management practices. Impacts to fauna are anticipated to be minimal. Impacts to avian species can be avoided or minimized by the use of mitigation strategies such as bird flight diverters and raptor perch deterrents.

Impacts to rare and unique natural resources are anticipated to be minimal, provided that best management practices are employed. The project will impact trees that could be used as roosting habitat by the Northern Long-Eared Bat, a threatened species. The U.S. Fish and Wildlife Service (USFWS) has noted that an incidental take permit may be necessary for the project. The take permit may impose conditions to mitigate potential impacts to this bat species.

Application of Routing Factors to Proposed Project

The Commission is charged with locating transmission lines in a manner that is “compatible with environmental preservation and the efficient use of resources” and that minimizes “adverse human and environmental impact[s]” while ensuring electric power reliability.¹ Minnesota Rule 7850.4100 lists 14 factors for the Commission to consider in its route permitting decisions.

Many of the impacts of the project, relative to the routing factors of Minnesota Rule 7850.4100, are anticipated to be minimal and mitigated by (1) the general conditions in section 5.0 of the Commission’s generic route permit template, (2) prudent pole placement and placement of the alignment within the permitted route, and (3) the requirements of downstream permits. The selection of certain routing options could also minimize and mitigate these impacts (discussed below).

Routing factors and elements of routing factors where special conditions in a Commission route permit are likely required to mitigate impacts include:

- **Human Settlements – Zoning and Land Use Compatibility.** The project is generally compatible with land uses in the project area. However, the applicants’ proposed route could adversely impact the Alajoki Cemetery. Impacts to the Alajoki Cemetery could be mitigated by not placing transmission line structures along the front edge of the existing cemetery or its future expansion.
- **Archaeological and Historic Resources.** Impacts to known archaeological and historic resources are anticipated to be minimal as a result of the project. However, because there is a moderate to high potential that the proposed route will impact unrecorded archaeological sites, the Minnesota State Historic Preservation Office recommends that a Phase I archaeological survey be conducted for the project.
- **Land-Based Economies – Forestry.** Impacts to local forestry are anticipated to be moderate as a result of the project. The project will impact approximately 60 acres of forested land. Impacts of the project are avoided and mitigated by the proposed route’s use of existing roadway and transmission line ROW. Impacts to trees can be further mitigated by prudent placement of the transmission line alignment and of specific structures to avoid forested areas. However, because of the prevalence of trees in the project area, impacts cannot be completely avoided or mitigated.

¹ Minnesota Statute 216E.02.

- **Natural Environment – Flora.** Impacts to flora are anticipated to be minimal with the exception of impacts to trees. Impacts to trees are anticipated to be moderate – the project will impact approximately 60 acres of trees. Impacts to flora can be mitigated by prudent placement of the transmission line alignment and specific structures to avoid flora, particularly trees.
- **Natural Environment – Fauna.** Impacts to fauna are anticipated to be minimal as a result of the project. However, impacts to avian species could range from minimal to moderate. Impacts to avian species can be mitigated by the use of bird flight diverters. The USFWS has indicated a need for bird flight diverters near the Red Eye WMA. There may be other areas of the project where the Minnesota Department of Natural Resources (DNR) and USFWS would recommend the use of bird flight diverters.

Avian species with relatively larger wing spans may also be impacted by electrocution. The USFWS has indicated that raptor perch deterrents (to avoid possible raptor electrocution) would be appropriate for transmission line structures near the Red Eye WMA.

- **Rare and Unique Resources.** Impacts to rare and unique resources due to the project are anticipated to be minimal. However there are resources that could be impacted by the project and for which mitigation measures have been recommended by the DNR and USFWS, including old growth forests and a threatened species, the Northern Long-Eared Bat.

Potential Impacts of Route and Site Alternatives

Impacts of route and site alternatives analyzed in this EA are similar to those of the proposed project and to each other. In some instances, the alternatives offer a means to avoid or mitigate potential impacts. In doing so, the alternatives offer tradeoffs.

West of the city of Menahga, the Blueberry route alternative minimizes aesthetic impacts of the project by placing it away from residences; however, it utilizes less existing ROW and impacts more acres of trees and forested wetlands than the proposed route.

The impacts of the western Blueberry substation site alternative are the same as the proposed Blueberry substation site except for cost. The western Blueberry substation site is more expensive than the proposed substation site.

In the southern project area, the Pipeline South and East of 109th Ave. route alternatives are near the fewest residences and thus minimize aesthetic impacts. The proposed route and the 119th Ave. and U.S. Route 71 route alternatives best place like infrastructure with like, and thus also minimize aesthetic impacts. Impacts to forested acres are similar across routing options – the East of 109th route alternative impacts relatively more forested acres; the proposed route impacts the fewest number of forested acres. Costs are similar across routing options. The Pipeline South route alternative is relatively more expensive than other routing options.

Relative Merits of Route and Site Alternatives

As with the applicants' proposed route, many of the impacts of the route and site alternatives, relative to the routing factors of Minnesota Rule 7850.4100, are anticipated to be minimal and mitigated by the conditions in the Commission's generic route permit template, prudent pole placement, and the requirements of downstream permits.

Aesthetic impacts of the project could be minimized by using the Blueberry route alternative. In the southern project area, aesthetic impacts could be minimized by avoiding residences (Pipeline South and East of 109th Ave. route alternatives) and by placing like infrastructure with like (119th Ave. and U.S Route 71 route alternatives and the proposed route). Impacts to forested lands could be minimized by utilizing the proposed route. Costs for the project could be minimized by using the proposed Blueberry substation site and by routing options other than the Pipeline South route alternative.

1.0 Introduction

This document is an environmental assessment (EA) that has been prepared for the Menahga Area 115 kV transmission line project proposed by Great River Energy and Minnesota Power (applicants). This EA evaluates the potential human and environmental impacts of the applicants' proposed project and possible mitigation measures, including route and site alternatives. Additionally, this EA evaluates potential alternatives to the project itself.

The EA is intended to facilitate informed decision-making by state agencies, particularly with respect to the goals of the Minnesota Environmental Policy Act – “to create and maintain conditions under which human beings and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of the state's people.”²

1.1 Proposed Project

The applicants propose to construct approximately 22.5 miles of new 115 kV transmission line from the existing Hubbard substation westward to a new Straight River substation, and then southward to a new Blueberry substation near the city of Menahga and to a new Red Eye substation (**Figure 1**).³ The project is proposed to include a short section of double-circuit 115 kV line, from the existing Hubbard substation to County Road 115, relocation of the existing Menahga substation to the new Blueberry substation, and modifications to the existing Hubbard and Pipeline substations.

Applicants are requesting a 500 foot route width for the project with a larger route width in select areas. Applicants indicate that the new 115 kV line will require a right-of-way (easement) of 100 feet. Transmission line structures for the new 115 kV line will be 60 to 90 feet in height, with a span between structures in the range of 275 to 400 feet. Applicants indicate that construction on the project is anticipated to commence in late spring 2016 and be completed by early 2017. The estimated total project cost is \$23 million dollars.

Project Location

The proposed project is located in the Minnesota counties of Hubbard, Becker, and Wadena. The applicant's proposed route traverses Hubbard Township and Straight River Township in Hubbard County. The proposed route follows the Becker-Wadena county line – in Runeberg Township, Becker County and Blueberry Township, Wadena County. The proposed route passes just west of the city of Menahga. The project traverses Blueberry Township and Red Eye Township in Wadena County.

1.2 Project Need

Applicants indicate in their application that the proposed project is needed to relieve potential overloads on the existing 34.5 kV transmission system near the city of Menahga, and to serve a proposed, new Minnesota Pipeline Company oil pumping station in the area.⁴

² Minnesota Statute 116D.02.

³ Great River Energy and Minnesota Power, Application to the Minnesota Public Utilities Commission for a Certificate of Need and Route Permit for the Menahga Area 115 kV Transmission Line Project, January 15, 2015, eDockets Numbers [20151-106222-01](#), [20151-106222-02](#), [20151-106222-03](#), [20151-106222-04](#), [20151-106222-05](#), [20151-106222-06](#) [hereinafter CN and Route Permit Application].

⁴ CN and Route Permit Application, Section 5.1.

1.3 State of Minnesota Review Process

In order to construct the proposed project, applicants must obtain two approvals from the Minnesota Public Utilities Commission (the Commission) – a certificate of need (CN) and a route permit. The Commission’s docket numbers for these approvals are ET2, E015/CN-14-787 and ET2, E015/TL-14-797. The applicants submitted a joint CN and route permit application to the Commission on January 15, 2015. In addition to these approvals from the Commission, the project will require approvals (e.g., permits, licenses) from other state agencies, federal agencies and local units of government (see Section 2.3).

With the applicants’ joint CN and route permit application, the Commission has before it two distinct considerations: (1) whether the proposed project is needed, or whether some other project would be more appropriate for the State of Minnesota, for example, a project of a different type or size, or a project that is not needed until further into the future; and (2) if the proposed project is needed, where it is best located. To aid the Commission in these considerations, the Commission gets assistance from several state agencies, including the Department of Commerce (Department) and the Office of Administrative Hearings (OAH).

The Department’s Energy Regulation and Planning (ERP) staff provides testimony on the need for proposed energy projects. ERP staff represents the public interest and ensures that ratepayers’ and the State of Minnesota’s long-term interests are represented.

Department Energy Environmental Review and Analysis (EERA) staff is responsible for conducting environmental review for CN and route permit applications submitted to the Commission. The intent of this review is to ensure that citizens, local governments, agencies and the Commission are aware of the potential human and environmental impacts of a proposed project and that the Commission can consider these impacts when determining whether a project is needed and where it should be located.

The OAH, at the request of the Commission, provides an administrative law judge (ALJ) to conduct a public hearing for a proposed project. The ALJ facilitates the hearing to gather input (advocacy) on whether projects are needed and where they should be located. The ALJ submits a report to the Commission which summarizes the input received during the hearing.

Environmental Review

EERA staff has prepared this EA for the Commission, which has before it the applicants’ joint CN and route permit application, and for other agencies and entities that have permitting authority related to the project. Additionally, this EA has been prepared to assist citizens in providing guidance to the Commission and other decision-makers regarding the project. The EA evaluates the potential human and environmental impacts of the project and possible mitigation measures, including route and site alternatives.

Additionally, the EA evaluates potential alternatives to the project itself. The EA does not advocate or state a preference for a specific route or site or for an alternative to the project itself. The EA analyzes and compares potential impacts and mitigation measures, including route and site alternatives, such that citizens, local governments, agencies and the Commission can work from a common set of facts.

EERA staff initiated work on this EA by soliciting comments on: (1) the issues and impacts that should be evaluated in the EA; (2) the mitigation measures to study, including route and site alternatives; and (3)

alternatives to the project itself that should be studied. This process of soliciting comments on the contents of the EA is known as “scoping.” EERA solicited comments through a public meeting on March 24, 2015, and a public comment period that ended April 10, 2015.

Based on the scoping comments received, the Department issued the scoping decision for this EA on May 26, 2015 (**Appendix A**). The scoping decision includes those route and site alternatives that are evaluated in this EA – including alternatives beyond those proposed by the applicants. All of the alternatives are analyzed in this EA with same level of detail and analysis, and evaluated against the routing factors of Minnesota Rule 7850.4100.

Once completed and issued, the EA will be entered in the records for these proceedings, so that it can be used by the ALJ and the Commission in making decisions about the project.

Public Hearing

After the EA is issued, an ALJ will conduct a public hearing for the project. The hearing will be held in the project area. Interested persons will have an opportunity at the hearing to ask questions, provide comments, and advocate for the route(s), site(s), and mitigation measures that they believe are most appropriate for the project.

The ALJ will submit a report to the Commission which summarizes the input received during the public hearing. The Commission will use the ALJ report, the EA, and the entire record in deciding whether to grant a CN and route permit for the project.

1.4 Organization of the Environmental Assessment

This EA addresses the issues required in Minnesota Rules 7849.1500 and 7850.3700 and those identified in the Department’s scoping decision of May 26, 2015 (**Appendix A**), and is organized as follows:

Section 1.0	Introduction	The introduction provides an overview of the proposed project, the State of Minnesota’s review process, and this EA.
Section 2.0	Regulatory Framework	Section 2.0 describes the regulatory framework associated with the project, including the Commission’s certificate of need and route permitting processes and other permits and approvals required for the project.
Section 3.0	Proposed Project and Route and Site Alternatives	Section 3.0 describes the Menahga Area 115 kV project as proposed by the applicants. It also describes the route and site alternatives analyzed in this EA. This section also describes the engineering and construction of the project
Section 4.0	Alternatives to the Proposed Project	Section 4.0 describes the feasibility, availability, and potential impacts of alternatives to the proposed project.

Section 5.0	Potential Impacts of the Proposed Project	Section 5.0 details the potential impacts of the proposed project to human and natural resources and identifies measures that could be implemented to avoid, minimize, or mitigate these impacts. This section also discusses the proposed project with respect to the routing factors of Minnesota Rule 7850.4100.
Section 6.0	Potential Impacts of Route and Site Alternatives	Section 6.0 describes the potential impacts of route and site alternatives to human and natural resources and measures to avoid, minimize, or mitigate these impacts. This section also discusses the relative merits of the alternatives with respect to the routing factors of Minnesota Rule 7850.4100.

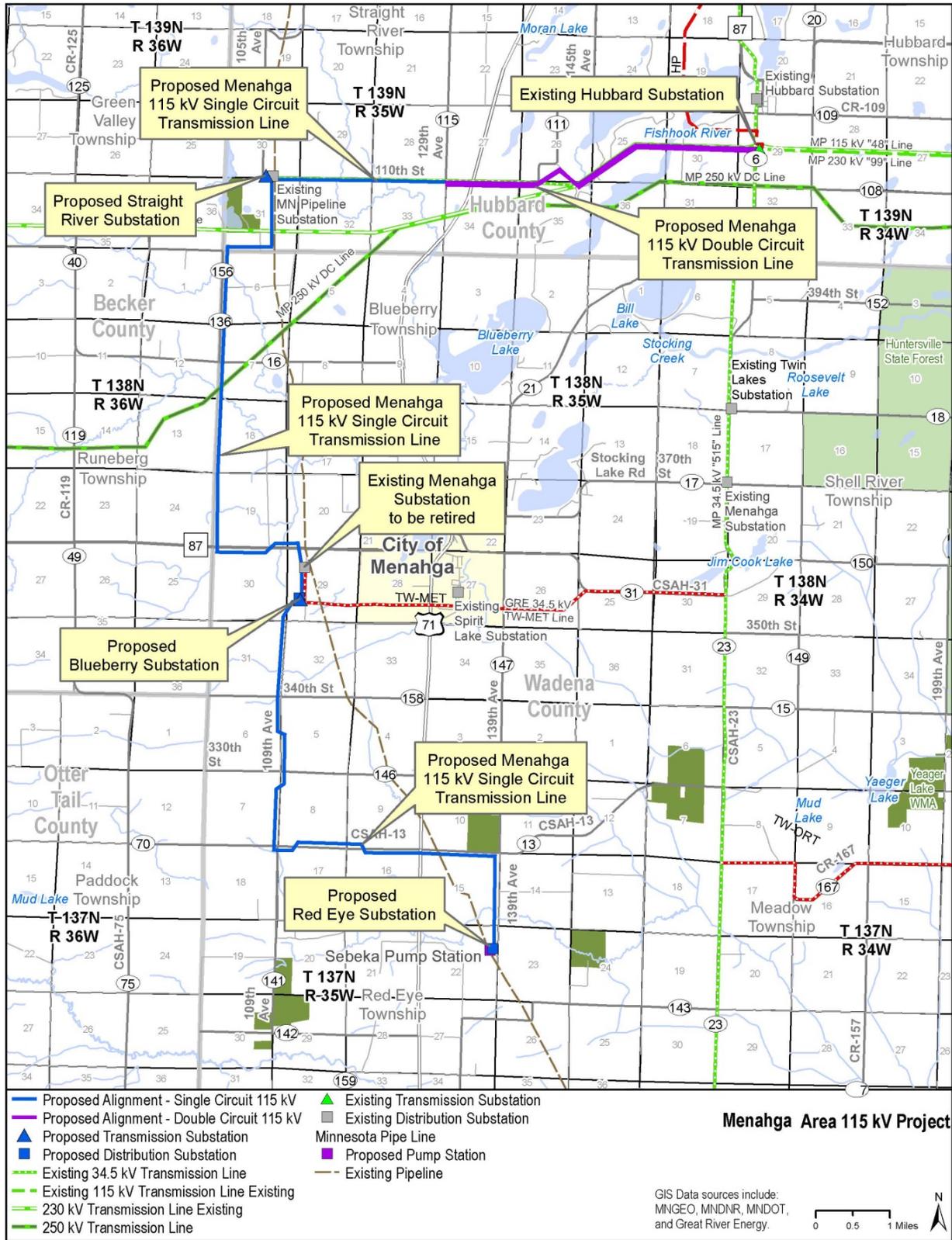
1.5 Sources of Information

The primary source of information for this EA is the joint CN and route permit application submitted by Great River Energy and Minnesota Power. Additional sources of information are indicated in footnotes. New and additional data has been included from the applicants. Information from prior EERA environmental review documents and other state agencies is included. Information was also gathered by a site visit.

Spatial Data Sources

A number of spatial data sources, which describe the resources in the project area, were used in preparing this EA (**Appendix F**). 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.

Figure 1. Project Overview Map



2.0 Regulatory Framework

The Menahga Area 115 kV project requires two approvals from the Minnesota Public Utilities Commission (Commission) – a certificate of need (CN) and a route permit. Additionally, the project will require approvals from other state and federal agencies with permitting authority for actions related to the project.

2.1 Certificate of Need

No person may construct a large energy facility in Minnesota without a certificate of need from the Commission.⁵ A high voltage transmission line is a large energy facility if it (1) has a capacity of 200 kV or more and is greater than 1,500 feet in length, or (2) has a capacity of 100 kV or more with more than 10 miles of its length in Minnesota, or (3) has a capacity of 100 kV or more and crosses a state line.⁶

The proposed project, a 115 kV transmission line with a length of approximately 22.5 miles, qualifies as a large energy facility and thus requires a CN. The applicants submitted a joint CN and route permit application to the Commission on January 15, 2015. After accepting the application as complete, the Commission referred the application to the Office of Administrative Hearings (OAH) for a public hearing, to be conducted jointly with the hearing for the route permit application (discussed below).

Environmental Review

CN applications to the Commission are subject to environmental review by Department of Commerce (Department) Energy Environmental Review and Analysis (EERA) staff.⁷ EERA staff is required to prepare an environmental report (ER) for high voltage transmission lines (HVTLs) needing a CN. An ER is a document which describes the potential human and environmental impacts of the project, particularly those impacts associated with the size, type and timing of the project. The ER also addresses alternatives to the project, commonly referred to as “system alternatives.” Minnesota Rule 7849.1500 lists system alternatives that are required to be evaluated in an ER.

When there are two approvals before the Commission for a single transmission line project – a CN and a route permit application – the Department may elect to combine the environmental reviews required for each approval. In this instance, the Department may prepare an environmental assessment (EA) in lieu of an ER.⁸ For the applicants’ proposed project, the Department has elected to combine the environmental reviews required for the project and issue one EA to address the CN and route permit approvals.

EERA staff solicited public comments on alternatives to the project to study in the EA. Commission staff and EERA staff held a joint public information and EA scoping meeting on March 24, 2015 in the city of Menahga. A comment period, ending on April 10, 2015, provided the public an opportunity to propose system alternatives for consideration in the scope of the EA.

One comment was received during the scoping process that proposed an alternative to the applicants’ project. This alternative proposed a relocated and reconfigured Straight River substation, rather than

⁵ Minnesota Statute 216B.243.

⁶ Minnesota Statute 216B.2421.

⁷ Minnesota Rule 7849.1200.

⁸ Minnesota Rule 7849.1900.

the Hubbard substation, as the northern substation endpoint for the project (see **Appendix A**). This alternative, however, introduced substantial new impacts related to transmission efficiencies and expansion and to project costs.⁹ As a result, the alternative was not carried forward for study in this EA.

Accordingly, the system alternatives evaluated in this EA are those required by Minnesota Rule 7849.1500 (see **Appendix A**).

Public Hearing

Upon completion of the 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 OAH. In accordance with the Commission's order in this matter, the hearing on the CN will be held jointly with the hearing for the route permit (discussed below). At the public hearing, citizens will have an opportunity to submit comments, present evidence and ask questions. After the public hearing, the ALJ will submit a report to the Commission that summarizes the hearing proceedings and comments. The ALJ's report, the EA, and the entire record will be presented to the Commission for a final decision. A Commission decision on a CN is anticipated in early 2016.

Certificate of Need Decision

In making a CN decision, the Commission must determine whether the applicant's proposed project is needed, or whether some other project would be more appropriate for the State of Minnesota, e.g., a project of a different type or size. The Commission must consider whether the need for the project can be better met through conservation measures or through the use of renewable resources.¹⁰ Minnesota Rule 7849.0120 provides the following criteria that must be met in order for a CN to be granted for the project:

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

Within 12 months of the submission of an application, the Commission must approve or deny a CN for the proposed project.¹¹ The Commission may extend this time for good cause.

⁹ Appendix A; see also Department of Commerce Comments and Recommendations to the Commission on the Scoping Process and Route and Site Alternatives, May 6, 2015, eDockets Number [20155-110162-01](#).

¹⁰ Minnesota Statutes 216B.2422 and 216B.243.

¹¹ Minnesota Statute 216B.243.

2.2 Route Permit

In Minnesota, no person may construct a high voltage transmission line without a route permit from the Commission.¹² A high voltage transmission line 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 greater than 1,500 feet in length.¹³ Associated facilities of a transmission line may include substations, buildings, equipment, and other physical structures that are necessary to the operation of a high voltage transmission line.

The proposed project will consist of approximately 22.5 miles of new 115 kV transmission line and therefore requires a route permit from the Commission. The applicants submitted a joint CN and route permit application to the Commission on January 15, 2015. The application was accepted as complete by the Commission on March 18, 2015. The applicants have indicated their intention to utilize the Power Plant Siting Act's alternative permitting process for the project. Because the project will operate at voltage of 115 kV, the project is eligible for this process.¹⁴ The alternative permitting process includes environmental review and a public hearing, and typically takes six to nine months to complete.

Environmental Review

Applications to the Commission for high voltage transmission line route permits are subject to environmental review conducted by EERA staff.¹⁵ Projects proceeding under the alternative permitting process require the preparation of an environmental assessment (EA).¹⁶ An EA is a document which describes the potential human and environmental impacts of the proposed project and potential mitigation measures. The Department of Commerce determines the scope of the EA. The Department may include alternative routes and sites suggested by the public in the scope of the EA if such alternatives will assist in the Commission's decision on the route permit. The EA must be completed and made available prior to the public hearing for the project.

On March 24, 2015, Commission staff and EERA staff held a joint public information and EA scoping meeting in the city of Menahga. The purpose of the meeting was to provide information to the public about the proposed project, to answer questions, and to allow the public an opportunity to suggest impacts and alternatives that should be considered in the EA for the project. Approximately 35 persons attended the meeting. Comments were received from several persons at the meeting. Comments included impacts and mitigation measures to study in the EA, including specific route alternatives. Specific impacts suggested for study included impacts to property values, dairy farms, rare plants, and windbreaks.

A comment period followed the public meeting and was open through Friday, April 10, 2015. Comments were received from 10 persons and one state agency. These comments included impacts and mitigation measures to study in the EA, including specific route and site alternatives.

¹² Minnesota Statute 216E.03.

¹³ Minnesota Statute 216E.01.

¹⁴ Minnesota Statute 216E.04, Subd. 1.

¹⁵ Minnesota Statute 216E.04, Subd. 5.

¹⁶ Id.

Commenters noted potential impacts to property values, gravel pits, rare plants, windbreaks, and television/cell phone reception. Commenters also noted potential impacts to beef and dairy cattle. One commenter noted potential impacts to a local cemetery.

The Minnesota Department of Transportation (MnDOT) noted its accommodation policy for the placement of utilities along and across highway rights-of-way. MnDOT indicated that the applicants' proposed route along Highway 87, west of the city of Menahga, may occupy a portion of the highway ROW. Further, MNDOT noted that tree coverage along Highway 87 is extensive, and that MnDOT's roadside vegetation management unit will need to review potential impacts to native plant communities, threatened and endangered plant species, specimen trees, and other woody vegetation along the MnDOT Highway 87 ROW.

EERA staff provided a summary of the scoping process to the Commission and an opportunity for Commission comment on the alternatives to study in the EA.

After consideration of the joint CN and route permit application, public comments received, and the Commission's review of the scoping process, the deputy commissioner of the Department of Commerce issued a scoping decision on May 26, 2015 (**Appendix A**). The scoping decision identifies the route and site alternatives that are evaluated in this EA and those alternatives that were not carried forward for evaluation. EERA staff provided notice of the scoping decision to those persons on the project mailing list and to all landowners along alternatives newly proposed during the scoping process.

Public Hearing

Upon completion of the EA, a public hearing will be held in the project area.¹⁷ The hearing will be presided over by an administrative law judge (ALJ) from the Office of Administrative Hearings. Members of the public will have an opportunity to speak at the hearing, present evidence, ask questions, and submit comments. The ALJ will provide a report to the Commission that summarizes the hearing proceedings and comments.

Comments received during the hearing on the EA become part of the record in the proceeding. EERA staff will respond to comments on the EA during the hearing comment period, but staff is not required to revise or supplement the EA document. Upon completion of the environmental review and hearing process, the record will be presented to the Commission for a final decision. A decision by the Commission on a route permit for the project is anticipated in early 2016.

Permit Decision

The Commission is charged with selecting routes that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity.¹⁸ Route permits issued by the Commission include a permitted route and anticipated alignment, as well as conditions specifying construction and operation standards. The Commission's generic route permit template is included in **Appendix B**.¹⁹ An example route permit previously issued by the Commission is included in **Appendix C**.

¹⁷ Minnesota Statute 216E.04, Subd. 6.

¹⁸ Minnesota Statute 216E.02.

¹⁹ Generic Route Permit Template for a High Voltage Transmission Line, Minnesota Public Utilities Commission, July 2, 2015, eDockets Number [20157-112081-01](#).

Minnesota Statute Section 216E.03, subdivision 7(b) identifies 12 considerations that the Commission must take into account when designating transmission lines routes.²⁰ Minnesota Rule 7850.4100 lists 14 factors for the Commission to consider when making a decision on a route permit:²¹

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

The Commission must make specific findings that it has considered locating a route for a new high voltage transmission line along an existing high voltage transmission line route or parallel to existing highway right-of-way and, to the extent these are not used for the route, the Commission must state the reasons why.²² At the time the Commission makes a final decision on a route permit, the Commission must determine whether the EA and the record created at the public hearing address the issues identified in the scoping decision.²³

²⁰ Minnesota Statute 216E.03, Subd. 7.

²¹ Minnesota Rule 7850.4100.

²² Minnesota Statute 216E.03, Subd. 7.

²³ Minnesota Rule 7850.3900.

The Commission is charged with make a final decision on a route permit within 60 days after receipt of the ALJ's report.²⁴ A final decision must be made within six months after the Commission's determination that an application is complete. The Commission may extend this time limit for up to three months for just cause or upon agreement of the applicant.²⁵

If issued a route permit by the Commission, the applicants may exercise the power of eminent domain to acquire land for the project.²⁶

2.3 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.²⁷ 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 permissible.²⁸

This said, various federal, state, and local permits may be required for activities related to the construction and operation of the project. All permits subsequent to the Commission's issuance of a route permit and necessary for the project (commonly referred to as "downstream permits") must be obtained by a permittee. **Table 1** includes a list of downstream permits that may be required for the project.

Federal Approvals

The United State Army Corps of Engineers (USACE) regulates potential impacts to waters of the United States. Dredged or fill material, including material that moves from construction sites into these waters, could impact the quality of the waters. The USACE requires permits for projects that may cause such impacts.

The U.S. Fish and Wildlife Service (USFWS) requires permits for the taking of threatened or endangered species.²⁹ The USFWS encourages consultation with project proposers to ascertain a project's potential to impact these species and to identify mitigation measures for the project generally.

State Approvals

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

A general national pollutant discharge elimination system / sanitary disposal system (NPDES/SDS) construction stormwater permit from the Minnesota Pollution Control Agency (MPCA) is required for stormwater discharges from construction sites. A permit is required if a project disturbs one acre or

²⁴ Id.

²⁵ Id.

²⁶ Minnesota Statute 216E.12.

²⁷ Minnesota Statute 216E.10.

²⁸ Id.

²⁹ U.S. Fish and Wildlife Service, Endangered Species, <http://www.fws.gov/ENDANGERED/permits/index.html>.

more of land. The general NPDES/SDS permit requires (1) use of best management practices, (2) a stormwater pollution prevention plan, and (3) adequate stormwater treatment capacity once the project is constructed.

Table 1. Potential Permits and Approvals³⁰

Jurisdiction	Permit
Federal Approvals	
U.S. Army Corps of Engineers	Section 10 Permit, Section 404 Permit
U.S. Fish and Wildlife Service	Endangered Species Consultation
State of Minnesota Approvals	
Department of Natural Resources	License to Cross Public Waters and Lands, Endangered Species Consultation
Minnesota Pollution Control Agency	NPDES/SDS Stormwater Construction Permit
Minnesota Department of Transportation	Utility Crossing Permit
Board of Water and Soil Resources	Wetland Conservation Act
Local Approvals	
County, Township, City	Road Crossing Permit, Overwidth Load Permit, Driveway Permit, Land or Building Permit

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

A permit from the Minnesota Department of Transportation (MnDOT) is required for transmission lines that are adjacent to or cross over Minnesota trunk highway rights-of-way. MnDOT’s 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.³¹

³⁰ CN and Route Permit Application, Section 2.5.

³¹ Minnesota Department of Transportation, Utility Accommodation on Highway Right of Way, <http://www.dot.state.mn.us/policy/operations/op002.html#6>.

Local Approvals

The Commission's route permit supersedes local planning and zoning regulations and ordinances.³² However, permittees must obtain local approvals necessary for proper local government functioning – e.g., the safe use of local roads; the inclusion of transmission line infrastructure on LGU maps.

2.4 Applicable Codes

The applicant's proposed project must meet the requirements of the National Electrical Safety Code (NESC).³³ The code is designed to protect human health and the environment. It also ensures that the transmission line and all associated structures are built from high quality materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment, provided that routine maintenance is performed.

Utilities must also comply with North American Electric Reliability Corporation (NERC) standards.³⁴ NERC standards define the reliability requirements for planning and operating the electrical transmission grid in North America.

2.5 Issues Outside the Scope of the Environmental Assessment

In accordance with the scoping decision for this EA (**Appendix A**), the following topics are not addressed in this document:

- Any route or site alternative not specifically identified for study in the scoping decision.
- Any system alternative not specifically identified for study in the scoping decision.
- Policy issues concerning whether utilities or local governments should be liable for the cost to relocate utility poles when roadways are widened.
- The manner in which landowners are paid for transmission right-of-way easements.

³² Minnesota Statute 216E.10.

³³ Minnesota Statute 326B.35 (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 B, Section 5.4.1, Generic Route Permit Template (requiring compliance with NESC standards).

³⁴ Appendix B, Section 5.4.1 of Generic Route Permit Template (requiring compliance with NERC standards).

3.0 Proposed Project and Route and Site Alternatives

The applicants propose to build approximately 22.5 miles of new 115 kV transmission line in central Minnesota. This section describes the applicants' proposed project including the proposed route, structures, and facilities, and how the project will be constructed. This section also describes route and site alternatives that could be used for the project.

3.1 Applicant's Proposed Route

The applicants propose to construct approximately 22.5 miles of new 115 kV transmission line from the existing Hubbard substation westward to a new Straight River substation, southward to a new Blueberry substation near the city of Menahga and then to a new Red Eye substation (see **Figure 1** and route maps in **Appendix D**).³⁵ The proposed project includes:

- Construction of approximately seven miles of east-west 115 kV transmission line between the existing Hubbard substation and the proposed new Straight River substation. The new line will replace an existing 34.5 kV line (522 feeder line).³⁶ The existing 34.5 kV line must remain energized until the new 115 kV line is constructed and operational; thus, the 34.5 kV line will not be removed until the new 115 kV line is operational.

The first 4.5 miles of the new 115 kV line, between the Hubbard substation and County Road 115, would be double-circuit 115 kV line. Applicants propose this double-circuiting in anticipation of a future project in the area (Osage project) that would connect at County Road 115. The applicants suggest that constructing two circuits as part of the project, instead of one, is relatively safer, more cost-effective, and would result in fewer environmental impacts.³⁷ If constructed, the second circuit on the double-circuit structures would not be energized until such time as the Osage project has received all necessary permits and approvals, and the remainder of the project is constructed. The 2.5 miles from County Road 115 to the Straight River substation would be single circuit 115 kV line.

- Construction of approximately 15 miles of north-south 115 kV transmission line between the proposed new Straight River substation and the proposed new Red Eye substation, with a connection to the proposed new Blueberry substation, near the city of Menahga.³⁸
- Construction of three new substations – the Straight River substation, the Blueberry substation, and the Red Eye substation; relocation of the existing Menahga substation to the proposed new Blueberry substation; and modifications to the existing Hubbard and Pipeline substations.³⁹

3.2 Route Width and Right-of-Way

When it issues a route permit, the Commission designates a route, a route width, and an anticipated alignment within that route width (**Figure 2**). The transmission line must be constructed within the

³⁵ CN and Route Permit Application, Section 1.5.

³⁶ CN and Route Permit Application, Section 4.1.1.

³⁷ CN and Route Permit Application, Sections 4.1.1 and 8.1.2.

³⁸ CN and Route Permit Application, Section 4.1.1.

³⁹ Id.

Commission's designated route.⁴⁰ The route width is typically larger than the actual right-of-way needed for the transmission line. This extra width provides flexibility in constructing the line, yet is not of such an extent that the placement of the line is undetermined. The route width and anticipated alignment are intended to provide flexibility and predictability.

The applicants have requested a route width of 500 feet for the new 115 kV transmission line – 250 feet on either side of the line in areas where the line runs cross country and 250 feet on either side of the centerline of road rights-of-way where the line follows a road.⁴¹ The applicants have requested additional route width in the following areas:⁴²

- In Section 26 of Straight River Township, a wider route width is proposed to allow flexibility for crossing an existing 230 kV line;
- At four substation locations to accommodate interconnections:
 - (1) At the existing Hubbard substation, an additional 150 by 650 feet on the north side of the substation,
 - (2) Around the proposed new Straight River substation, an additional 650 feet to the west of the existing Pipeline substation, and 500 feet north and 250 feet south of the 110th St. centerline,
 - (3) Around the proposed new Blueberry substation, an additional 100 feet to the north, 150 feet to the south, and 450 feet to the west of the substation site, and
 - (4) Around the proposed new Red Eye substation, an additional 400 by 750 feet generally west of the substation site.

The proposed route parallels and crosses existing transmission lines in the project area. The new 115 kV line is proposed to cross an existing 230 kV line in Sections 31 and 35 of Straight River Township. The line will also cross an existing 250 kV direct current (DC) line in Section 7 of Blueberry Township. At this location, the applicants indicate that the 250 kV DC line will need to be raised in order to accommodate the 115 kV line crossing underneath it.⁴³

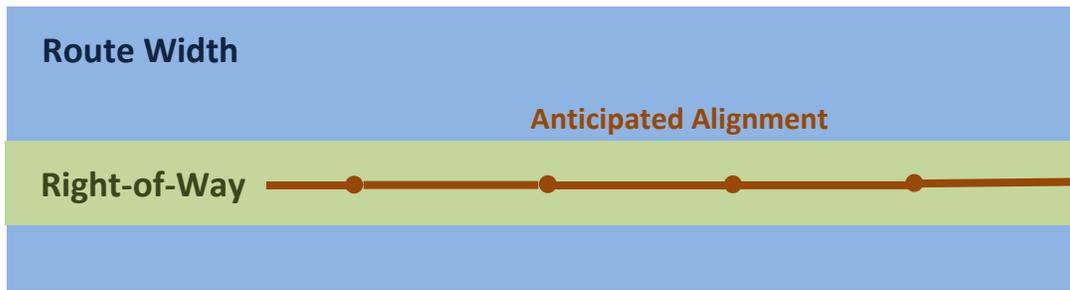
⁴⁰ Appendix B, Generic Route Permit Template.

⁴¹ CN and Route Permit Application, Section 4.1.1.

⁴² Id.

⁴³ Id.

Figure 2. Route Width and Right-of-Way Illustration⁴⁴



Right-of-Way

The right-of-way (ROW) for a specific transmission line is determined by the Commission in its route permit. The ROW is that specific area required for the safe construction and operation of the transmission line, where such safety is defined by NESC and NERC standards (see Section 2.4). The applicants indicate that a 100 foot right-of-way (ROW) will be needed for the project (50 feet on either side of the transmission side).⁴⁵ Applicants will seek easements from landowners for this ROW (see Section 3.6, below). The ROW may be slightly wider in some areas to accommodate guy wires and anchors.

The applicants indicate that a 100 foot ROW is Great River Energy's standard ROW for a 115 kV line.⁴⁶ Applicants note that a 100 foot ROW ensures that the conductors will – under all circumstances, including high winds – remain at a safe distance from objects within and near the transmission line ROW.

The new 115 kV ROW will, in many areas, overlap with existing transmission line or roadway ROW. Applicants indicate that new transmission line poles will generally be placed 3 to 7 feet outside of existing road rights-of-way (**Figure 3A**).⁴⁷ Where there are other utilities adjacent to a roadway, e.g., a natural gas line, the new transmission poles will be placed outside of the ROW for these utilities (**Figure 3B**). This placement may be modified to mitigate potential impacts identified during the route permitting process or to accommodate landowner requests. In some instances existing transmission or distribution lines may need to be moved or removed yet remain in service until the new 115 kV line is energized. In these instances, the existing lines may be leaned over to accommodate construction of the new 115 kV line. Distribution lines can be placed back on the new transmission line structures (a process known as “underbuilding”) or placed underground.

⁴⁴ Illustration not to scale.

⁴⁵ CN and Route Permit Application, Section 4.1.1.

⁴⁶ Id.

⁴⁷ CN and Route Permit Application, Section 8.2.

Figure 3A. Schematic of Right-of-Way Sharing with Roadway⁴⁸

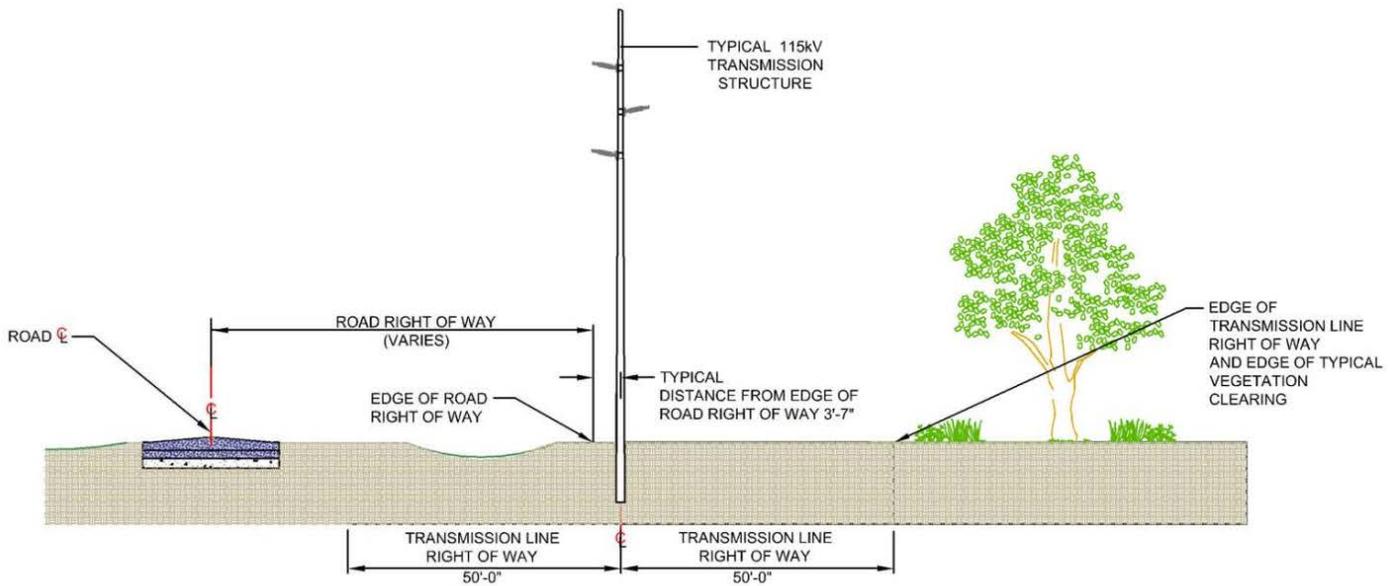
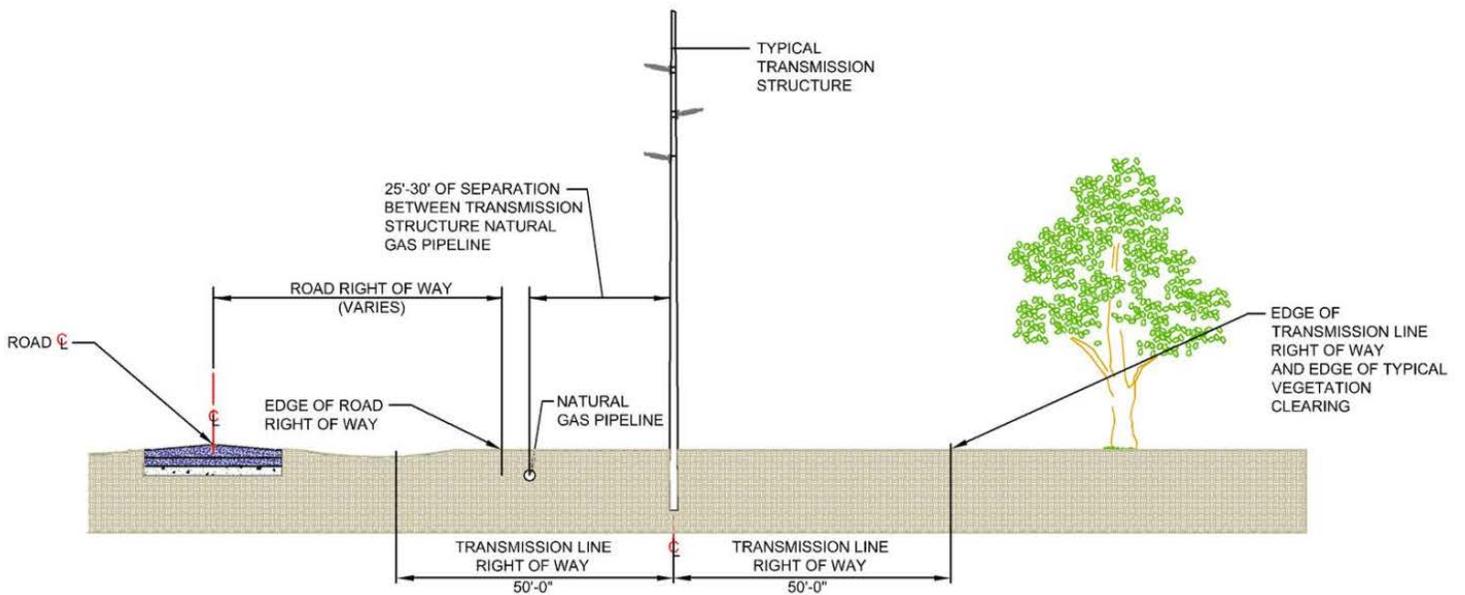


Figure 3B. Schematic of Right-of-Way Sharing with Roadway and Utilities⁴⁹



⁴⁸ Schematic is not to scale.

⁴⁹ Schematic is not to scale.

3.3 Substations

The proposed project includes the construction of three new substations – the Straight River substation, the Blueberry substation, and the Red Eye substation; relocation of the existing Menahga substation to the proposed new Blueberry substation; and modifications to the existing Hubbard and Pipeline substations.

Straight River Substation

The Straight River substation is proposed to be constructed just west of the existing Pipeline substation and the existing Park Rapids oil pumping station – a pumping station for a Minnesota Pipeline Company (MPL) crude oil pipeline. Once constructed, the Straight River substation will provide power to the Pipeline substation, which in turn will provide power to the pumping station. The fenced area of the Straight River substation is anticipated to be approximately 150 by 180 feet.⁵⁰ The substation will include a 115/34.5 kV transformer and associated switches, communications, and metering equipment.⁵¹

Blueberry Substation and Menahga Substation

The Blueberry substation is proposed to be constructed just west of the city of Menahga and south of the existing Menahga substation. The existing Menahga substation will be relocated to within the Blueberry substation and the existing Menahga site will be retired, including the removal of all equipment, structures, and fencing (**Figure 4**).⁵² The site will be restored and conveyed to the appropriate landowner(s).⁵³

The fenced area of the Blueberry substation is anticipated to be approximately 240 by 415 feet.⁵⁴ The substation will include a 115/34.5 kV transformer, a 115.12.47 kV transformer, and associated buses, breakers, switches, and communications equipment.⁵⁵

Red Eye Substation

The Red Eye substation is proposed to be constructed approximately five miles south of the city of Menahga and to be the southern terminus of the project. The Red Eye substation will provide power to a new Sebeko oil pumping station, a pumping station for MPL's Line 4 crude oil pipeline. The fenced area of the Red Eye substation is anticipated to be approximately 125 by 125 feet.⁵⁶ The substation will include a 115/4.16 kV transformer and associated buses, switches, and communications equipment.⁵⁷

Hubbard and Pipeline Substations

The existing Hubbard and Pipeline substations are proposed to be modified as part of the project. The Hubbard substation is the northern terminus of the project. It will be modified to accommodate the new 115 kV line, including removal of an existing transformer and installation of a new breaker,

⁵⁰ CN and Route Permit Application, Section 4.1.2.

⁵¹ Id.

⁵² Id.

⁵³ Additional Project Information from Applicants, August 21, 2015, eDockets Number [20158-113442-01](#).

⁵⁴ CN and Route Permit Application, Section 4.1.2

⁵⁵ Id.

⁵⁶ Id.

⁵⁷ Id.

switches, and communications equipment.⁵⁸ The fenced area of the Hubbard substation will not change as a result of the project. The existing Pipeline substation will be fed from the new Straight River substation. This feed may require modifications at the Pipeline substation. The extent of these modifications will not be known until further engineering can be completed.⁵⁹ The fenced area of the Pipeline substation will not change as a result of the project.

Figure 4. Menahga Substation⁶⁰



3.4 Route and Site Alternatives

The applicants have proposed a route and substation sites for the project (discussed above). Based on comments received during the scoping process and on the EA scoping decision (**Appendix A**), this EA evaluates route and site alternatives beyond those proposed by the applicants. Any of these alternatives could be selected by the Commission for the project. The alternatives are discussed here; the potential impacts and relative merits of the alternatives are discussed in Section 6.

⁵⁸ Id.

⁵⁹ Id.

⁶⁰ View looking west from 111th Ave.

Blueberry Route Alternative and Western Blueberry Substation Site Alternative

There is one route alternative and one substation site alternative in Blueberry Township, Wadena County, near the city of Menahga (**Figure 5**). The Blueberry route alternative, instead of following the applicants' proposed route along Highway 87, would follow the county line (Wadena Line Rd.) south approximately 0.7 miles and then turn eastward crossing Section 30 of Blueberry Township and enter the Blueberry substation from the west.

The western Blueberry substation site alternative would place the Blueberry substation on the western edge of Section 30 of Blueberry Township, at the point where the Blueberry route alternative turns eastward. If the Blueberry substation were constructed at this alternative site, an existing 34.5 kV line would need to be extended westward to reach the substation. This alternative substation site would only be used in conjunction with the Blueberry route alternative.

Blueberry to Red Eye Route Alternatives

There are four route alternatives that could be used to connect the Blueberry substation to the Red Eye substation (**Figure 5**):

- The Pipeline South route alternative would proceed from the Blueberry substation, east along the 34.5 kV line right-of-way, and then southeast along the western edge of the Minnesota Pipeline Company (MPL) right-of-way to the Red Eye substation (**Figure 6**).
- The East of 109th Ave. route alternative would proceed from the Blueberry substation, south along 111th Ave. and then cross country, east of and parallel to 109th Ave. to County State Aid Highway 13 (CSAH 13). From CSAH 13, this alternative would follow the applicants' proposed route to the Red Eye substation.
- The 119th Ave. route alternative would proceed from the Blueberry substation, south along 111th Ave., east along 350th St., and then south along 119th Ave. and cross country to CSAH 13. From CSAH 13, this alternative would follow the applicants' proposed route to the Red Eye substation.
- The U.S. Route 71 route alternative would proceed from the Blueberry substation, east along the 34.5 kV line right-of-way, and then south along U.S. Route 71 to CSAH 13. From CSAH 13, this alternative would follow the applicants' proposed route to the Red Eye substation.

Figure 5. Route and Site Alternatives

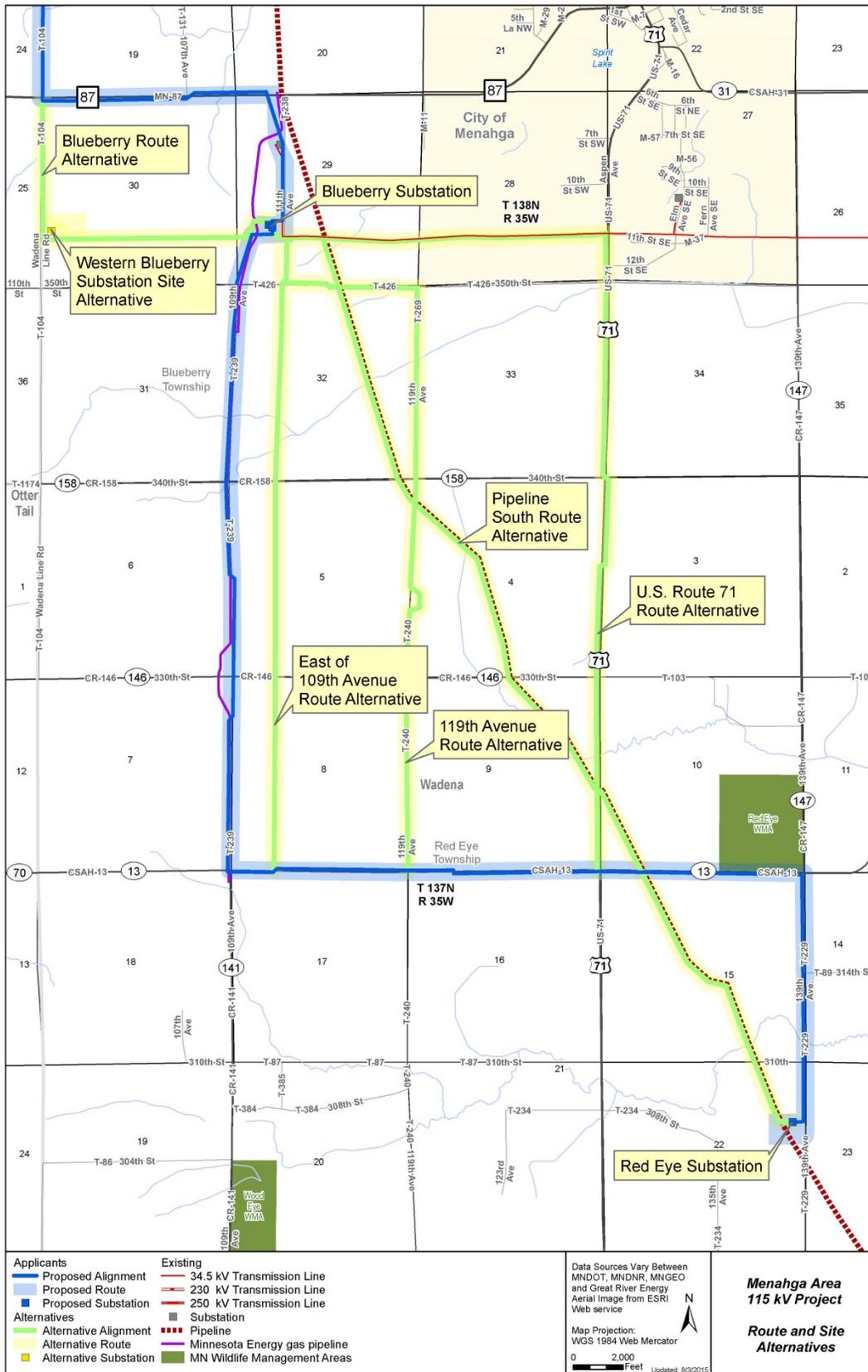


Figure 6. View of Pipeline South Route Alternative⁶¹



3.5 Structures and Conductors

The applicants propose to use single pole wood structures ranging in height from 60 to 90 feet for the project (**Figure 7**).⁶² Structure height depends on several factors including terrain and environmental constraints.⁶³ Structures that facilitate a change in route direction, e.g., turning a corner, are typically larger in size in order to maintain proper tension on the transmission line. Such structures are known as “angle” or “dead end” structures.

Spans for single circuit structures will range from 275 to 400 feet.⁶⁴ Spans for double circuit structures will range from 350 to 400 feet.⁶⁵ In some areas of the project, local distribution lines will be underbuilt.

⁶¹ View looking northwest from County State Aid Highway 13.

⁶² CN and Route Permit Application, Section 4.1.1.

⁶³ Id.

⁶⁴ Id.

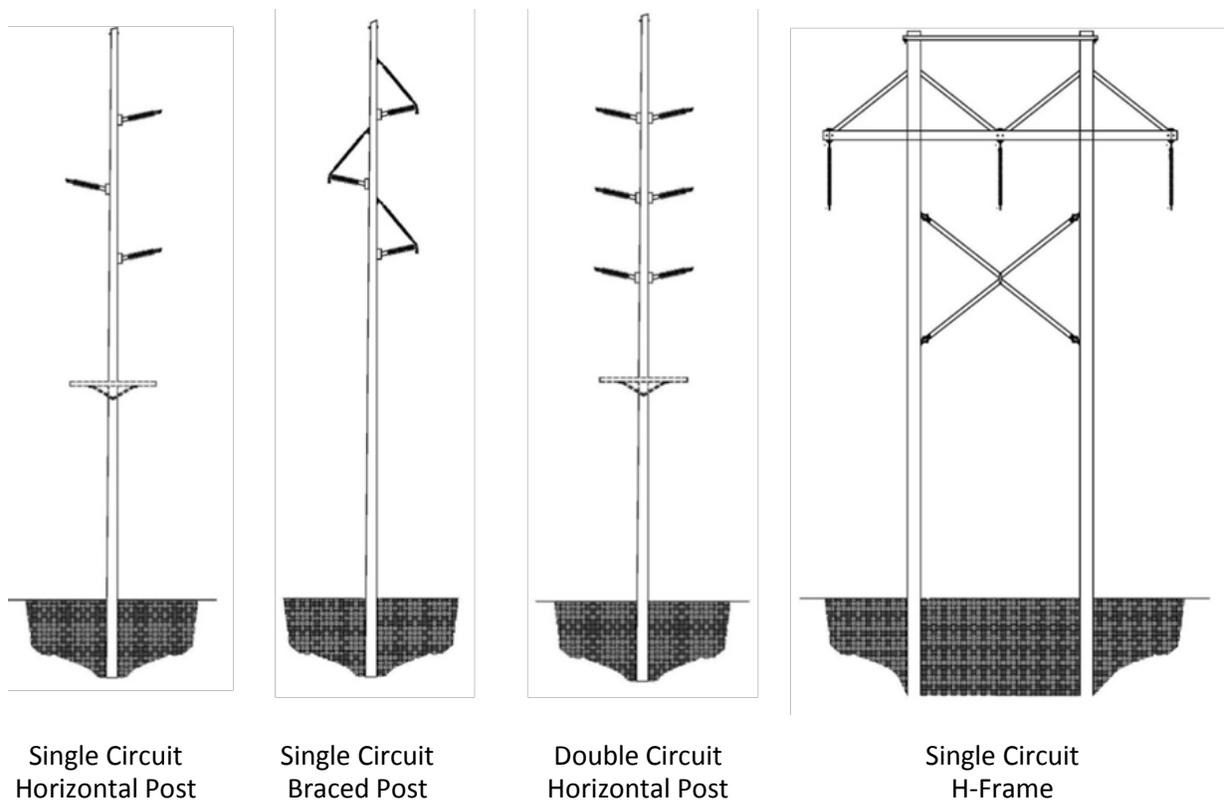
⁶⁵ Id.

For sections that are underbuilt, spans will be relatively shorter – ranging from 250 to 300 feet.⁶⁶ The average diameter of wood structures at ground level is 20 inches.⁶⁷

For areas of the project where longer spans are required, e.g., to avoid impacts to streams or wetlands, the applicants propose to use H-frame structures (**Figure 7**).⁶⁸ These structures are approximately the same height as single pole structures (60 to 90 feet), but can span distances from 600 to 1000 feet.⁶⁹

Single circuit structures will carry three conductors and a shield wire.⁷⁰ Double circuit structures will carry six conductors (three conductors on each side of the structure) and a shield wire.⁷¹ The applicants anticipate using a 477 26/7 aluminum core steel reinforced (ACSR) conductor for the project.⁷²

Figure 7. Transmission Line Structure Types



⁶⁶ Id.
⁶⁷ Id.
⁶⁸ Id.
⁶⁹ Id.
⁷⁰ Id.
⁷¹ Id.
⁷² Id.

Existing Structures and Conductors

In locations where the new 115 kV line will displace an existing distribution line, the distribution line will be underbuilt on the new line or placed underground.⁷³ Structures for existing distribution lines in the area range from 25 to 45 feet tall; structures for the existing 34.5 kV line are approximately 40 to 45 feet tall.⁷⁴

Existing lines may be temporarily leaned over or moved to allow construction of the new 115 kV line.⁷⁵ For that segment of the project between the existing Hubbard substation and the proposed new Straight River substation, the new 115 kV line will replace an existing 34.5 kV line. The existing 34.5 kV line must remain energized until the new 115 kV line is constructed and operational; thus, the 34.5 kV line will not be removed until the new 115 kV line is energized.⁷⁶

The new 115 kV line is proposed to cross an existing 230 kV line in Sections 31 and 35 of Straight River Township. No changes to the existing 230 kV structures are anticipated to accommodate these crossings. The line will also cross an existing 250 kV direct current (DC) line in Section 7 of Blueberry Township (**Figure 8**). At this location, the applicants indicate that the 250 kV DC line will need to be raised in order to accommodate the 115 kV line crossing underneath it.⁷⁷ The DC line will be placed on new, taller steel poles.⁷⁸ The final design for these poles and the number of poles needed will be determined after detailed design is completed for the 115 kV line.⁷⁹ Applicants indicate that the new poles would be installed during a scheduled DC line outage.⁸⁰

⁷³ CN and Route Permit Application, Section 8.2.

⁷⁴ Additional Project Information from Applicants.

⁷⁵ CN and Route Permit Application, Section 8.2.

⁷⁶ CN and Route Permit Application, Sections 4.1.1 and 8.4.

⁷⁷ CN and Route Permit Application, Section 4.1.1.

⁷⁸ Additional Project Information from Applicants.

⁷⁹ Id.

⁸⁰ Id.

Figure 8. Existing DC Line in Blueberry Township⁸¹



3.6 Construction and Maintenance

Construction of the project would not begin until all federal, state, and local approvals have been obtained. Construction is anticipated to begin in late spring 2016; however, the construction timeline is dependent upon a number of factors including the receipt of all approvals, weather, and the availability of labor and materials.

Right-of-Way Acquisition

Upon issuance of a route permit by the Commission, the applicants will conduct a design survey to establish a transmission line alignment and right-of-way (ROW) that is consistent with the Commission's permit. This work will be followed by easement acquisition for the required ROW. The applicants indicate that they will obtain new easements for the entire length of the project.⁸² Minnesota Power or the Todd-Wadena Electric Cooperative may hold existing easements in areas where the new 115 kV line will displace existing transmission and distribution lines.⁸³

⁸¹ View looking north along Wadena Line Road.

⁸² CN and Route Permit Application, Section 8.3.

⁸³ Id.

During the easement acquisition process, landowners will be provided 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 provide just compensation for the utility's use of the easement.⁸⁴ In addition to permanent easements for the operation of the transmission line, agreements for the use of temporary work space (marshalling yard agreements) may be obtained from some landowners – e.g., to stage or store structures, vehicles, and supplies.

If a negotiated agreement for an easement cannot be reached, the applicants may use the eminent domain process to reach a settlement.⁸⁵ In the eminent domain process, three court-appointed commissioners determine the value of the easement, and both the landowner and applicants are bound by this determination. If the eminent domain process is used, the applicants must obtain at least one appraisal for the property proposed to be acquired.⁸⁶

Construction

Construction of the project would not begin until approvals are obtained and all land rights secured. Applicants indicate that they will notify all landowners prior to the start of construction and provide an update on the project schedule and construction activities.⁸⁷

Vegetation Removal

The initial phase of construction is right-of-way (ROW) clearance. As a general practice, all tall growing vegetation is removed from the ROW. Low growing vegetation at the outer edges of the ROW is allowable.⁸⁸ Low growing vegetation within the ROW, provided it does not pose a threat to the operation or maintenance of the line, may remain in the ROW, consistent with easement agreements.⁸⁹ The primary concern regarding vegetation is the potential for vegetation to interfere with the safe and reliable operation of the transmission line.

The applicants 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.⁹⁰ 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.

The applicants indicate that they will use best management practices to minimize and mitigate vegetation clearing impacts.⁹¹ Standard Commission route permit conditions require permittees to minimize tree removal and preserve windbreaks, shelterbelts and vegetation generally (**Appendix B**).

⁸⁴ Rights-of-Way and Easements for Energy Facility Construction and Operation, Minnesota Department of Commerce, http://mn.gov/commerce/energyfacilities/documents/Easements_Fact_Sheet_08.05.14.pdf.

⁸⁵ Minnesota Statute 117.

⁸⁶ Minnesota Statute 117.036.

⁸⁷ CN and Route Permit Application, Section 8.4.

⁸⁸ Id.

⁸⁹ Id.

⁹⁰ Id.

⁹¹ Id.

Structure Placement

The new 115 kV line will be constructed at or near the existing grade along the proposed route; therefore, structure sites will not be graded or leveled unless necessary for construction activities. Structures would be placed directly in the ground after excavating a hole 8 to 11 feet deep. The average structure depth for a 70-foot long pole would be approximately nine feet.⁹² Structures are then set and the holes backfilled. In some locations and for specific structures, concrete foundations may be necessary.

Once structures have been erected for the line, conductors are strung. Stringing setup areas will be located approximately every two miles along the route. During this process, temporary guard or clearance structures will be used at crossings to provide adequate clearance over roads, existing lines, and other potential obstructions. Stringing activities will commence only after notifications have been provided and permits obtained such that potential impacts to traffic flow and other activities in the project area are minimized.

The applicants indicate that they will use best management practices to minimize and mitigate impacts related to structure placement and the stringing of conductors.⁹³ The applicants note that the new 115 kV line will cross several wetlands and waterways. The applicants indicate that crossings of these resources in order to place poles and string conductors will be limited and undertaken only after discussion with resources agencies.⁹⁴ Where waterways must be crossed, the applicants indicate they will minimize potential impacts by crossing by foot, using boats, or crossing across ice during winter conditions.⁹⁵ Standard Commission route permit conditions require permittees to minimize impacts to wetland and water resources (**Appendix B**).

Restoration

As construction is completed on various sections of the route, these sections will be restored.⁹⁶ Restoration includes removal of all debris and all temporary facilities, employing erosion control measures, reseeding with appropriate seed mixes – free of noxious and invasive weeds – and restoring the project area to its original condition to the extent possible.⁹⁷ In areas where soil compaction has occurred, applicants indicate that they will alleviate the compaction by any of several methods, in consultation with the landowner.⁹⁸ Restoration requirements and measures are standard route permit conditions (see **Appendices B and C**).

A right-of-way agent will contact landowners to determine if restoration has been completed to their satisfaction and whether damage has occurred during construction of the project.⁹⁹ Applicants indicate that they will restore damaged property as near as possible to its original condition and/or fairly compensate landowners for damages.¹⁰⁰

⁹² Id.

⁹³ Id.

⁹⁴ Id.

⁹⁵ Id.

⁹⁶ Id.

⁹⁷ Id.

⁹⁸ Id.

⁹⁹ Id.

¹⁰⁰ Id.

Maintenance

Applicants will use the transmission line ROW to perform inspections, maintenance, and repairs. Regular inspections of transmission lines are required to ensure reliable electrical performance. Applicants anticipate inspecting the new 115 kV line annually. Applicants will conduct inspections by foot, snowmobile, all-terrain vehicle, and by air.¹⁰¹ Substation equipment maintenance and repair will occur periodically and will occur within the substation footprints.

Applicants indicate that they will conduct vegetation surveys every two years and will remove, in accordance with applicable easement agreements, vegetation that would interfere with the operation of the transmission line. Right-of-way clearing practices include mechanical and hand clearing, along with the use of herbicides (where allowed and in accord with applicable easement agreements). Native plants that will not interfere with the safe operation of or access to the transmission line will be allowed to reestablish in the ROW.

Substations

Substation construction would begin with removal of vegetation (as needed) and grading of the substation site.¹⁰² A concrete foundation and fencing would then be installed.¹⁰³ Substation equipment – e.g., control house, breakers, switches, transformers – would be placed on the foundation.¹⁰⁴ Once equipment is installed, transmission lines would be connected. When construction is complete, the substation site would be restored (discussed above).

3.7 Project Costs

The estimated total cost for the project is approximately \$23 million dollars.¹⁰⁵ These costs are divided between Great River Energy and Minnesota Power. Estimated costs for Great River Energy's portion of the project are \$20.2 million dollars (**Table 2A**).¹⁰⁶ Estimated costs for Minnesota Power's portion of the project are \$2.8 million dollars (**Table 2B**).¹⁰⁷

Annual operation and maintenance costs for a 115 kV line in the Great River Energy system, including ROW maintenance, are approximately \$2,000 dollars per mile of transmission line.¹⁰⁸

¹⁰¹ CN and Route Permit Application, Section 4.7.

¹⁰² Additional Project Information from Applicants.

¹⁰³ Id.

¹⁰⁴ Id.

¹⁰⁵ CN and Route Permit Application, Section 4.2.

¹⁰⁶ Id.

¹⁰⁷ Id.

¹⁰⁸ Id.

Table 2A. Estimated Project Costs – Great River Energy¹⁰⁹

Project Item	Estimated Cost (dollars)
Great River Energy Costs	
115 kV Transmission Line	\$12,937,000
Switches, Meter	\$560,000
Hubbard Substation	\$1,240,000
Blueberry Substation	\$3,000,000
Red Eye Substation	\$1,500,000
Relocation of Menahga Substation	\$1,000,000
Great River Total Costs	\$20,237,000

Table 2B. Estimated Project Costs – Minnesota Power¹¹⁰

Project Item	Estimated Cost (dollars)
Minnesota Power Costs	
115 kV Transmission Line at Straight River Substation	\$620,000
Straight River Substation	\$2,140,000
Straight River to Pipeline 34.5 kV Tap	\$50,000
Minnesota Power Total Costs	\$2,810,000

¹⁰⁹ Id.

¹¹⁰ Id.

4.0 Alternatives to the Proposed Project

The Commission's certificate of need (CN) proceedings evaluate whether a proposed project is needed, or whether there is some other project that would be more appropriate for the State of Minnesota – e.g., a project of a different type or size, or a project that is not needed until further into the future. Environmental review in a CN proceeding provides the Commission and the public with information on the potential human and environmental impacts of a proposed project and those alternatives that could meet the stated need.

In accordance with the scoping decision (**Appendix A**), this EA analyses those alternatives to the project listed in Minnesota Rule 7849.1500. This analysis includes discussion of whether the alternatives are feasible and available, and, if so, whether they can meet the need for the project. Additionally, included here is discussion of the potential human and environmental impacts of the alternatives. Analysis of the specific impacts and potential mitigation measures for the applicants' proposed project is provided in Section 5. The alternatives discussed here are:

- No-build alternative
- Demand side management
- Purchased power
- Transmission line of a different size, including upgrading an existing transmission line
- Generation rather than transmission
- Use of renewable energy resources

Of these, as discussed further below, a transmission line with different endpoints is the only alternative that is feasible and available and that could meet the stated need for the project. However, based on analysis by the applicants, this alternative is less effective in meeting the need than the applicants' proposed project.

4.1 Need for the Project

Applicants indicate in their application that the proposed project is needed to: (1) relieve potential overloads on the existing 34.5 kV transmission system in the project area, particularly overloads related to the largest electrical load in the area, the city of Menahga, and (2) to serve a proposed, new Minnesota Pipeline Company oil pumping station in the area.¹¹¹

System Overloads

The applicants indicate that several factors are responsible for an increased risk of transmission system overloads in the project area, including growth of peak electrical demand in the project area and the age and length of the existing 34.5 kV transmission network in the area.¹¹² Applicants note that an outage on the existing 34.5 kV system between the Hubbard and Verndale substations would lead to a thermal overload of the system and loss of electrical power in the project area.¹¹³ The applicants indicate that

¹¹¹ CN and Route Permit Application, Section 5.1.

¹¹² Id.

¹¹³ Id.

the project would improve reliability of the electrical system in the project area, including the cities of Menahga, Nimrod, Sebeka, and Verndale, as well as outlying areas.¹¹⁴

New Oil Pumping Station

The Minnesota Pipeline Company (MPL) is proposing to increase the throughput of its existing Line 4 oil pipeline.¹¹⁵ In order to do so, MPL must add pumping stations to the existing line. MPL is proposing to add a new pumping station (Sebeka pumping station) just north of the city of Sebeka, in Red Eye Township, Wadena County. Pumping stations use relatively large electrical motors that draw substantial amounts of electrical energy.

The applicants indicate that a new oil pumping station could not be served by the existing 34.5 kV transmission system in the project area. The applicants note that a higher voltage line, one capable of meeting the electrical energy needs of a pumping station is required. The new 115 kV line is capable of meeting the energy needs of the proposed Sebeka pumping station. The pumping station is anticipated to receive its electrical energy from the proposed Red Eye substation, the southern terminus of the project.

4.2 No-Build Alternative

Under the no-build alternative, the applicants' proposed project would not be constructed and all other electrical transmission facilities in the project area would remain as is.

The no-build alternative is feasible and available, but would not meet the need for the project. This alternative would not relieve overloads on the existing 34.5 kV transmission system nor would it accommodate a new oil pumping station. The existing 34.5 kV system would remain insufficient for growing electrical demand in the project area and incapable of reliable service should there be a single outage on the system (e.g., temporary loss of a transmission line or substation). The no-build alternative would be unable to supply power to a new oil pumping station and thus would frustrate the Commission's determination that a greater throughput for MPL's Line 4 is needed.¹¹⁶

The no-build alternative would have no direct human or environmental impacts. It would, however, adversely affect the local transmission system and reduce electrical reliability. In addition, it would impede greater use of MPL's existing Line 4 oil pipeline and the benefits associated with this use.

4.3 Demand Side Management

Demand side management is the industry term for a suite of measures designed to reduce and manage demand for electrical energy, particularly peak loads. The applicants indicate that they are implementing, with Commission approval, such measures throughout their service areas.¹¹⁷

¹¹⁴ Id.

¹¹⁵ Id. Before constructing the new pumping stations that will increase the throughput of Line 4, MPL must seek and obtain a certificate of need for the stations and the additional throughput from the Commission. The Commission's docket number for MPL's certificate of need application is: PL-5/CN-14-320.

¹¹⁶ Commission Order Granting Certificate of Need, August 31, 2015, eDockets Number [20158-113640-01](#).

¹¹⁷ CN and Route Permit Application, Section 5.8. Conservation and management measures include interruptible demand programs, off-peak storage programs, rebate programs, and various energy conservation promotions.

Demand side management is feasible and available, but would not meet the need for the project. Applicants note that even if they were to meet all Commission-approved conservation goals, the reductions in energy use would not be sufficient to offset projected load growth in the project area.¹¹⁸ Additionally, applicants indicate that conservation measures would not transform the existing 34.5 kV transmission system such that it could meet the electrical energy needs of a new oil pumping station.¹¹⁹ Applicants note that conservation measures will continue to be implemented in the project area, but that these measures are not sufficient to address the inadequacies of the existing 34.5 kV system.¹²⁰

Demand side management would have few direct human or environmental impacts. However, attempting to meet the need for the project with demand side management would adversely affect the local transmission system and reduce electrical reliability. In addition, it would prevent greater use of MPL's existing Line 4 oil pipeline.

4.4 Purchased Power

Under a purchased power alternative, power would be purchased from existing sources, rather than generated by a new electric generating plant. This alternative is more relevant to a site permit application for a large electric power generating plant than a route permit for a transmission line project.

As discussed below (Section 4.6), the applicants estimate that approximately 17 megawatts (MW) of new electrical generation would need to be purchased in order to provide a load-serving capability equivalent to that of the proposed project.¹²¹ This additional electrical energy, once purchased, would need to be transmitted – through existing lines and substations or through new facilities – to the project area.

A purchased power alternative may be feasible and available, but it would not meet the need for the project. Purchasing power would not improve the reliability of the existing 34.5 kV transmission system, nor would it make the system less susceptible to a single outage. Unless the purchased power was delivered at or very near the proposed Red Eye substation, the power would not be reliably available for the proposed Sebeka pumping station.

The human and environmental impacts of purchased power would vary, depending on how the power was produced and how it was transmitted to the project area. Attempting to meet the need for the project with purchased power would adversely affect the local transmission system, reduce electrical reliability, and prevent expanded use of MPL's existing Line 4 oil pipeline.

4.5 Transmission Line of a Different Size

Under this alternative, the need for the project would be met by a transmission line of a different size – such as a line with a different voltage, a different amperage, or with different endpoints. A transmission line with a different voltage is an available alternative but is not feasible. A transmission line with a different amperage (i.e., an upgraded conductor) is available and feasible, but would not meet the need

¹¹⁸ Id.

¹¹⁹ CN and Route Permit Application, Section 6.10.1.

¹²⁰ Id.

¹²¹ CN and Route Permit Application, Section 6.2.

for the project. A transmission line alternative with different endpoints is available, feasible, and could meet the need for the project, but, per the applicants' analysis, not as well as the proposed project.

Transmission Line with a Different Voltage

The existing transmission system in the project area, the Hubbard-Verndale system, operates at a voltage of 34.5 kV. The applicants considered meeting the need for the project with voltages less than and greater than 34.5 kV.¹²²

Voltages less than 34.5 kV are classified as distribution voltages – i.e., they are voltages used to distribute electrical energy rather than transmit energy. It is possible, in some instances, to relieve specific electrical overloads by moving the overload from one distribution system to another. However, this solution works only where the distribution systems are served by independent transmission networks.¹²³ This solution is not available for the Hubbard-Verndale system. The Hubbard-Verndale system is an interconnected 34.5 kV system with several distribution substations. None of the substations are served by an independent transmission network such that a distribution load can be moved off of the Hubbard-Verndale system. Accordingly, the applicants concluded that a distribution voltage solution was not feasible for the project.¹²⁴

Applicants considered use of higher voltages for the project, but determined that a 115 kV line would address all overload and reliability issues and meet electrical energy needs for the foreseeable future.¹²⁵ The applicants considered use of a 161 kV line for the project. However, there are no 161 kV lines in the project area and introduction of this voltage would require substantial reworking of substation facilities to accommodate the voltage. The applicants also considered use of a 230 kV line. This voltage is designed for transmitting electrical energy over long distances and is not well suited to local transmission. Thus, applicants concluded that a higher voltage transmission line was not feasible for the project.¹²⁶

The human and environmental impacts of transmission line with a different voltage would be similar to those for the proposed project (Section 5). If a higher voltage line were utilized, taller structures would be required leading to relatively greater aesthetic impacts.

Transmission Line with a Different Amperage – Upgrading Existing 34.5 kV Facilities

The amount of electrical energy that can be carried by a transmission line is a function of the amperage that can be carried on the line and the voltage of the line. The amperage of a transmission line is dependent on the physical size of the conductor – in general, the larger the conductor, the larger the amperage it can commute. Thus, it is possible to increase the capacity of the existing 34.5 kV Hubbard-Verndale system by keeping the existing voltage (34.5 kV) and replacing the existing conductors with larger, higher amperage conductors.¹²⁷

¹²² CN and Route Permit Application, Section 6.4.

¹²³ Id.

¹²⁴ Id.

¹²⁵ Id.

¹²⁶ Id.

¹²⁷ CN and Route Permit Application, Section 6.5.

Existing 34.5 kV conductors in the project area are mainly of the aluminum conductor steel reinforced (ACSR) type and can carry in the range 15 to 30 megavolt amperes (MVA) (**Table 3**).¹²⁸ The applicants studied replacing these conductors with a larger, higher amperage conductor that could carry 40 to 60 MVA.¹²⁹ The applicants concluded that restringing the existing 34.5 kV system with new, larger conductors would increase the capacity of the electrical system; however, the system would still be constrained by transformers at the Verndale substation and by the Sebeka regulator station. In order to mitigate these constraints, equipment at the substation and regulator station would need to be upgraded.¹³⁰ The applicants also concluded that new conductors would not be able to carry sufficient energy to serve the proposed Sebeka pumping station.¹³¹ Thus, new conductors capable of carrying higher amperage would not meet the need for the project.

The human and environmental impacts of a transmission line with a different amperage would be minimal. Impacts would be limited to construction impacts due to restringing of the existing 34.5 kV system with a new conductors and equipment replacement at the Verndale substation and Sebeka regulator station.

Table 3. Electrical Capacity of Existing Conductors on Hubbard-Verndale System¹³²

Conductor Type	Length (miles)	Electrical Capacity (MVA)
1/0A	4.6	15.8
3/0A	18.4	16.7
4/0A	6.3	22.7
336 A	21.5	29.6

Transmission Line with Different Endpoints

Applicants indicate that they selected the proposed project, with endpoints at the Hubbard and Red Eye substations, because it best addresses system needs in the project area. However, the applicants did study a transmission alternative that utilized different endpoints.¹³³ This project would tap the existing Badoura – Dog Lake 115 kV line in Ansel Township, Cass County, proceed westward to a new substation in Orton Township, Wadena County, and continue on to the Red Eye substation (**Figure 9**).

This transmission alternative (Orton Tap alternative) is available, feasible, and could meet the need for the project.¹³⁴ The Orton Tap alternative would relieve overloads on the existing 34.5 kV system and would provide sufficient energy for the Sebeka pumping station.¹³⁵ Applicants indicate that the cost of

¹²⁸ CN and Route Permit Application, Section 6.5; Additional Project Information from Applicants.

¹²⁹ Id.

¹³⁰ CN and Route Permit Application, Section 6.5

¹³¹ Id.

¹³² Additional Project Information from Applicants.

¹³³ CN and Route Permit Application, Section 6.6.

¹³⁴ Id.

¹³⁵ Id.

the alternative would be similar to that of the proposed project.¹³⁶ However, applicants do not believe the Orton Tap alternative is the best solution for the project because (1) it does not provide a redundant source of power to the largest load in the area (the city of Menahga), and (2) it does not facilitate a planned transmission project just north of the project area, near Osage, Minn.¹³⁷ Thus, applicants concluded that the Orton Tap alternative does not meet the need for project as well as the proposed project.¹³⁸

Because they are approximately the same length and proceed through similar geographies, the human and environmental impacts of the Orton Tap alternative would be similar to those of the proposed project.

4.6 Generation Rather than Transmission

Under a generation alternative, new electrical generation would be added to the existing 34.5 kV system in lieu of the proposed new 115 kV line. The applicants estimate that approximately 17 MW of new electrical generation at the Sebekka regulator station would be needed in order to provide a load-serving capability equivalent to that of the proposed project.¹³⁹ Applicants studied the use of several small generators (1.5 to 2 MW) that would be used in combination to meet the 17 MW total.

The applicants concluded that a generation alternative was not feasible because (1) it would require replacement of existing transformers and regulators on the 34.5 kV system, (2) the costs of installation, operation, and maintenance are higher than the proposed project, and (3) generation is relatively less reliable than transmission.¹⁴⁰ The applicants also concluded that a generation alternative would not meet the stated need for the project because it would not improve the reliability of the existing 34.5 kV system.¹⁴¹

The human and environmental impacts of a generation alternative would depend on how the power was produced, e.g., diesel or natural gas fueled generators. Generators would create aesthetic, air quality, and noise impacts; however, these impacts would be concentrated near the generation site. In contrast, impacts for the proposed project are distributed along the length of the project.

¹³⁶ Id.

¹³⁷ Id. See also, 2013 Minnesota Biennial Transmission Projects Report, Section 6.4, Osage Area 115 kV Line, Commission Tracking Number 2013-NE-N22, <http://www.minnelectrans.com/report-2013.html>.

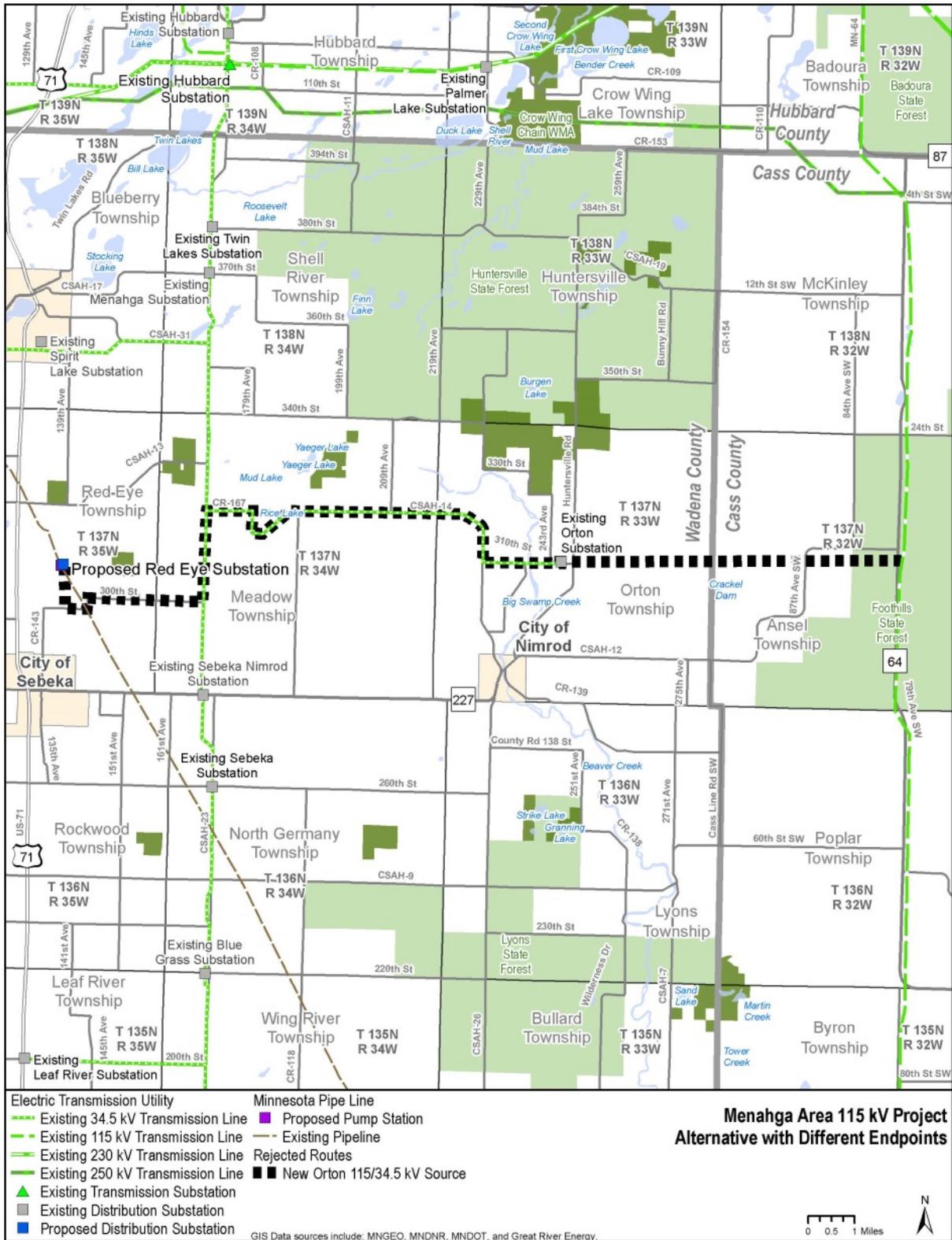
¹³⁸ CN and Route Permit Application, Section 6.6.

¹³⁹ CN and Route Permit Application, Section 6.2.

¹⁴⁰ Id.

¹⁴¹ Id.

Figure 9. Transmission Alternative with Different Endpoints



4.7 Use of Renewable Energy Resources

Under a renewable energy alternative, new electrical energy – generated by renewable resources – would be added to the existing 34.5 kV system in lieu of the proposed new 115 kV line. The applicants considered wind and solar generation as renewable resources that might meet the need for the project.¹⁴² Applicants concluded that these resources are not feasible and would not meet the need for the project.¹⁴³ Residential loads in the project area peak between 4 p.m. and 6 p.m.¹⁴⁴ Wind and solar generation, if available, are typically decreasing during this time period.¹⁴⁵ Additionally, as with generation of any type (discussed above), use of renewable energy resources does not improve the reliability of the existing 34.5 kV system.

The human and environmental impacts of a renewable energy alternative would depend on how the power was produced, e.g., wind or solar, and where these facilities were located. Wind and solar facilities create aesthetic impacts and these impacts could be distributed throughout the project area.

¹⁴² Id.

¹⁴³ Id.

¹⁴⁴ Id.

¹⁴⁵ Id.

5.0 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 – and by design and construction measures.

Short-term impacts of the project are anticipated to be similar to those of a construction project – noise, dust, soil disturbance and compaction, clearing of vegetation. The 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 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 project and may include aesthetic impacts, health impacts, economic impacts, land use restrictions and impacts to flora and fauna. 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 proposed Menahga Area 115 kV project. Section 6 of this EA discusses the potential impacts and mitigation measures associated with route and site alternatives identified in the scoping decision (**Appendix A**). These alternatives may avoid or minimize potential impacts of the project.

Potential Impacts and 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 the project may exert some influence; it is used in this EA as the basis for assessing the potential impacts to each resource as a result of the project. Regions of influence vary with the resource being analyzed and the potential impact. The ROI for resources analyzed in this EA are summarized in **Table 4**.

The ROI for most human and environmental resources is the transmission line ROW and the permanent footprint of the substations. Resources within the ROW and footprint could be impacted by the construction and operation of the project. For example, soils could be compacted; trees could 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:

- **Two hundred fifty feet.** A distance of 250 ft. from the anticipated alignment for the project will be used as the ROI for analyzing potential aesthetic, noise, property value, land use, and electric and magnetic field impacts. These are all potential impacts to human settlements or human health. A distance of 250 ft. on each side of the anticipated alignment is equivalent to the route

width for the project. Impacts may extend outside of the 250 ft. distance, but are anticipated to diminish relatively quickly such that potential impacts outside of this distance would be minimal.

- **One mile.** A distance of one mile from the project will be used as the ROI for analyzing potential impacts to archaeological and historic resources and to rare and unique species.

Direct impacts to archaeological and historic resources are anticipated to occur, if at all, within the ROW. However, indirect impacts may extend beyond the ROW. For example, a historic resource may be impacted by a transmission line near, but not directly next to, the resource. Direct impacts to rare habitats are anticipated to occur, if they occur, within the ROW. However, indirect impacts to rare and unique species may extend beyond the ROW, particularly for wildlife species. Wildlife may move throughout a project area and may be impacted by limitations on their movement and their ability to access cover, food, and water.

- **Project area / counties.** A project area, defined generally as the counties through which the project passes, will be used as the ROI for analyzing potential impacts to cultural values, socioeconomics, public utilities, airports, 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 (ROI)
Human Settlements	Displacement	Right-of-Way ¹⁴⁶
	Aesthetics, Noise, Property Values, Electronic Interference, Zoning and Land Use Compatibility	250 Feet ¹⁴⁷
	Socioeconomics, Cultural Values, Public Utilities, Airports, Emergency Services	Project Area
Public Health and Safety	Electric and Magnetic Fields, Implantable Medical Devices, Stray Voltage, Induced Voltage	250 Feet
	Air Quality	Project Area
Land-Based Economies	Agriculture, Forestry, Mining	Right-of-Way
	Tourism and Recreation	Project Area

¹⁴⁶ Right-of-way includes the transmission line ROW and the permanent footprint of all associated facilities, e.g., substations.

¹⁴⁷ On each side of the anticipated alignment for the project.

Type of Resource	Specific Resource / Potential Impact to Resource	Region of Influence (ROI)
Archaeological and Historic Resources	---	One Mile
Natural Environment	Water Resources, Soils, Flora, Fauna	Right-of-Way ¹⁴⁸
Rare and Unique Species	---	One Mile

Summary of Potential Impacts of the Proposed Project

Impacts to human settlements are anticipated to be minimal. Aesthetic impacts due to the project are unavoidable, but are anticipated to be minimal. The project has the potential to impact the Alajoki Cemetery, but these impacts can be minimized by prudent pole placement. Impacts to public health and safety and to public services are anticipated to be minimal. Impacts to known archaeological and historic resources are anticipated to be minimal. However, there is potential to impact unknown archaeological resources during construction of the project. These impacts can be mitigated, in part, by conducting an archaeological survey.

Impacts to land-based economies are anticipated to be minimal; however, impacts to trees and forestry are anticipated to be moderate. Impacts to trees are unavoidable, as the project area includes substantial amounts of forest. Impacts to trees can be minimized by prudent placement of the transmission line alignment and poles, particularly through right-of-way sharing with existing infrastructure.

Impacts to water resources and soils are anticipated to be minimal; such impacts can be mitigated by construction best management practices. Impacts to fauna are anticipated to be minimal. Impacts to avian species can be avoided or minimized by the use of mitigation strategies such as bird flight diverters and raptor perch deterrents.

Impacts to rare and unique natural resources are anticipated to be minimal; such impacts can be mitigated by best management practices. The project will impact trees that could be used as roosting habitat by the Northern Long-Eared Bat, a threatened species. The U.S. Fish and Wildlife Service has noted that an incidental take permit may be necessary for the project. The take permit may impose conditions to mitigate potential impacts to this bat species.

The Commission, when it issues a route permit for the project, can require the applicants to follow a specific route and alignment for the project and to use specific mitigation measures or require that certain mitigation thresholds or standards be met through permit conditions (see **Appendices B and C**).

5.1 Environmental Setting

The Menahga project area lies within the Northern Minnesota Drift and Lake Plains Section of the Laurentian Mixed Forest Province in northern Minnesota.¹⁴⁹ This section is characterized by deep glacial

¹⁴⁸ Avian species can move easily throughout the project area and are susceptible to collision with transmission line conductors. Thus, impacts to avian species will be considered and discussed with a ROI larger than the right-of-way.

deposits in outwash plains, moraines, and drumlin fields. Vegetation in the project area reflects the complex and patchy distribution of these glacial deposits.¹⁵⁰ Forests of sugar maple, basswood, paper birch, aspen, and northern red oak are common. Black spruce, tamarack, white cedar, and black ash are prominent on poorly drained soils.¹⁵¹

Kettle lakes and associated drainages and wetlands are common in the area.¹⁵² Lakes in the project area include Spirit Lake, Blueberry Lake, Stocking Lake, Twin Lakes, and Hinds Lake. Because of the area's forest and lakes, forestry and tourism are important economic activities.¹⁵³ Agriculture is common on well-drained soils that can be irrigated and includes crops and forages.¹⁵⁴

Built infrastructure in the project area includes cities, roads, and utilities. The city of Menahga is the largest community in the project area. The city was incorporated in 1892¹⁵⁵ and has approximately 1300 residents.¹⁵⁶ The primary road in the project area is U.S. Route 71, which runs roughly north-south in the area and passes through the city of Menahga. State Highway 87 runs generally in an east-west fashion and also passes through Menahga.

5.2 Socioeconomic Setting

According to 2010 census data, the project area has a median household income less than the median for the State of Minnesota (**Table 5**). The percentage of the population below the poverty level is higher in the project area than in the state as a whole (**Table 5**).

The economy in north central Minnesota, including the project area, is relatively diverse with the three largest industries, by employment, being professional and business services, government, and trade (**Figure 10**).¹⁵⁷ In 2012, north central Minnesota produced approximately \$10.6 billion dollars in goods and services, accounting for about two percent of Minnesota's 567.8 billion dollar economy.¹⁵⁸ The two largest industries, by economic output, are professional and businesses services and manufacturing.¹⁵⁹

¹⁴⁹ Laurentian Mixed Forest Province, <http://dnr.state.mn.us/ecs/212/index.html>; see also CN and Route Permit Application, Section 9.1.

¹⁵⁰ Id.

¹⁵¹ Pine Moraines & Outwash Plains Subsection, <http://www.dnr.state.mn.us/ecs/212Nc/index.html>.

¹⁵² Id.

¹⁵³ Id.

¹⁵⁴ Id.

¹⁵⁵ Minnesota Historical Society, www.mnhs.org.

¹⁵⁶ CN and Route Permit Application, Section 9.2.

¹⁵⁷ Economic Composition of North Central Minnesota: Industries and Performance, www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-North-Central-MN.pdf. For this report, north central Minnesota is defined as the five counties represented by the Region Five Development Commission – Wadena, Todd, Cass, Crow Wing, and Morrison.

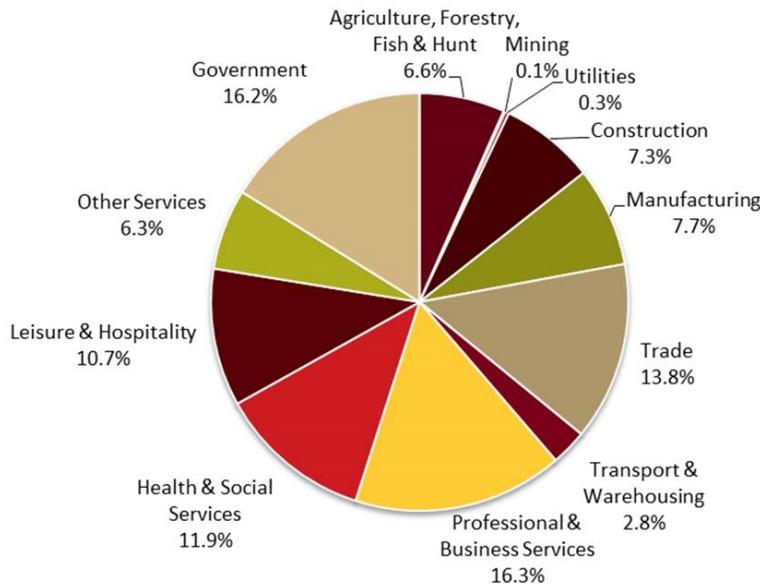
¹⁵⁸ Id.

¹⁵⁹ Id.

Table 5. Socioeconomic Characteristics of Project Area¹⁶⁰

Location	Population	Median Household Income (dollars)	Population Below Poverty Level (percent)
Minnesota	5,303,925	\$59,126	11.2
Hubbard County	20,428	\$45,623	12.1
Wadena County	13,843	\$35,767	18.4
Becker County	32,504	\$49,159	11.8
City of Menahga	1,306	\$33,292	18.0

Figure 10. Employment by Industry in North Central Minnesota¹⁶¹



5.3 Human Settlements

Transmission lines have the potential to negatively impact human settlements through a variety of means. Transmission structures could change the aesthetics of the project area, introduce new noise sources, lower property values, and interfere with electronic communications.

¹⁶⁰ CN and Route Permit Application, Section 9.2.5, Table 9-5.

¹⁶¹ Id.

Impacts to human settlements resulting from the Menahga Area 115 kV project are anticipated to be minimal. No residences will be displaced by the project; impacts to property values are anticipated to be minimal. Aesthetic impacts are unavoidable but are anticipated to be minimal. The project has the potential to impact the Alajoki Cemetery, but these impacts can be minimized by prudent pole placement. Impacts related to construction of the project are anticipated to be minimal and temporary.

Impacts to human settlements can be minimized by prudent routing – by choosing routes and alignments that avoid residences and businesses, and by utilizing existing transmission line and road right-of-way. Impacts can also be mitigated by limiting the project’s aesthetic impacts to structures, and by the use of structures which are, to the extent possible, harmonious with human settlements and activities.

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 in the project area includes rural residences, forested areas, agricultural lands, wetlands, and lakes.¹⁶² The city of Menahga is the largest community in the area and includes commercial and residential development. Manmade infrastructure in the project area includes highways and roads, electric transmission and distribution lines, and docks and piers on lakes. The topography of the project area is shaped by glaciation and is gently rolling, with drumlins and moraines. Because of the topography and interspersed forested areas, viewsheds in the project area are relatively limited in extent except along natural corridors (e.g., lakes, rivers) and manmade corridors (e.g., roads).

The applicant’s proposed route for the project utilizes existing transmission line and roadway rights-of-way. From the Hubbard substation to the Straight River substation, the 115 kV line follows, and will replace, an existing 34.5 kV line. From the Straight River substation to the Blueberry substation and then to the Red Eye substation, the 115 kV line follows existing roadway ROW except for approximately 1,100 feet near the Blueberry substation. Thus, the project utilizes existing transmission line or roadway ROW for approximately 99 percent of its length. The applicants propose to use single pole wood structures for the project ranging in height from 60 to 90 feet, with a span between structures of 275 to 400 feet (Section 3.5).

There are 28 residences and 39 non-residential buildings within 250 feet of the anticipated alignment of the new 115kV transmission line (**Table 6**). There is one business (an active gravel pit) within 100 feet of the anticipated alignment of the line (discussed further in Section 5.6).¹⁶³ There are no residences, non-residential buildings, or businesses within the anticipated right-of-way for the project, i.e., within 50 feet of the anticipated alignment.

¹⁶² CN and Route Permit Application, Section 9.2.4.

¹⁶³ CN and Route Permit Application, Section 9.2.2.

Table 6. Distance of Buildings from Anticipated Alignment¹⁶⁴

Building Type	0 to 50 feet	51 to 100 feet	101 to 150 feet	151 to 200 feet	201 to 250 feet	Total
Residences	0	1	3	19	5	28
Non-Residential	0	6	7	13	13	39

The closest residence to the new Straight River substation is approximately 600 feet west of the substation.¹⁶⁵ The closest residence to the new Blueberry substation is approximately 1050 feet south of the substation.¹⁶⁶ The closest residence to the new Red Eye substation is approximately 730 feet southwest of the substation.¹⁶⁷

Potential Impacts

Aesthetic impacts due to the project are anticipated to be minimal. There are four residences within 150 feet of the anticipated alignment of the line; however, the majority of residences (24) are 150 feet or more from the anticipated alignment (**Table 6**). The proposed route for the project follows existing transmission and roadway ROW. By so doing, the project places like with like – i.e., it places new infrastructure where there is already existing linear infrastructure. This placement makes the new line relatively harmonious with the existing landscape in the project area.

For that segment of the project between the Hubbard substation and Straight River substation, the new 115 kV line will replace an existing 34.5 kV line. The new structures will be in the range of 15 to 45 feet taller. Thus, aesthetic impacts due to the project are anticipated to be minimal as they will be incremental. The proposed project will introduce more conductors into the segment between the Hubbard substation and County Road 115 due to double circuiting (six new 115 kV conductors vs. three existing 34.5 kV conductors).

Transmission line structures between the Straight River substation and the Red Eye substation will be a visible new addition to the landscape and will create aesthetic impacts. However, because of the nature of the landscape and the distance between structures, only a few structures will likely be visible from any one location. Additionally, most residences are located greater than 150 feet from the anticipated alignment. The new structures may require tree clearing along the transmission line ROW (see Sections 5.6 and 5.10). This tree clearing would create adverse aesthetic impacts in forested areas along the route.

Because the Straight River substation and Blueberry substation are near existing distribution substations and because residences are relatively distant from all three proposed substations locations (Straight River, Blueberry, Red Eye), aesthetic impacts due to these substations are anticipated to be minimal.

¹⁶⁴ Additional Project Information from Applicants.

¹⁶⁵ CN and Route Permit Application, Section 9.2.3.

¹⁶⁶ Id.

¹⁶⁷ Id.

Mitigation

Aesthetic impacts resulting from the project are anticipated to be minimal. The primary strategy for minimizing aesthetic impacts is prudent routing, i.e., choosing routes and alignments that are most harmonious with the landscape. 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. To a great extent, the applicants' proposed route and anticipated alignment implement these strategies. The route follows existing transmission line and roadway ROW for approximately 99 percent of its length. The applicants' anticipated alignment is located along this ROW away from residences and moves from one side of the roadway ROW to the other to avoid residences and minimize aesthetic impacts. Alternative routes and sites that may minimize aesthetic impacts of the project are discussed in Section 6.

Adverse impacts can also be mitigated by ensuring that the aesthetic impacts of the project are limited to project structures and facilities. Thus, impacts can be mitigated by ensuring that damage to natural landscapes during construction is minimized, e.g., minimizing vegetation removal. The applicants indicate that they will work with landowners to best locate structures and to minimize damage to vegetation and natural landscapes.¹⁶⁸ 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 by plantings that minimize visual exposure of structures and substation facilities. Finally, aesthetic impacts can be mitigated through inclusion of specific conditions in individual easement agreements with landowners along the route, e.g., compensation or new plantings / landscaping.

Noise

Noise can be defined as unwanted sound. Noise is measured in units of decibels (dB) on a logarithmic scale. The A weighted decibel scale (dBA) corresponds to the sensitivity range for human hearing. A noise level change of 3 dBA is barely perceptible to average human hearing while a 5 dBA change in noise level is noticeable.

All noises produced by the project must be within Minnesota noise standards (**Table 7**). These standards are promulgated by the Minnesota Pollution Control Agency (MPCA). The standards are organized by the type of environment where the noise occurs (Noise Area Classification, NAC) and the time of day. The noise standards are expressed as a range of permissible dBA within a 1-hour period; L₅₀ is the dBA that may be exceeded 50 percent of the time within an hour, while L₁₀ is the dBA that may be exceeded 10 percent of the time within 1 hour.

The primary noise receptors in the project area would be residences. Residences are in noise area classification one (NAC 1). Noise receptors could also include citizens working outside or using recreational facilities in the project area. Because of the rural nature of the project area, ambient noise levels in the area are typically in the range of 30 to 40 dBA, with temporary higher noise levels associated with wind, vehicular traffic, and the use of gas-powered equipment, e.g., tractors, chain saws.¹⁶⁹

¹⁶⁸ CN and Route Permit Application, Section 9.2.4.

¹⁶⁹ CN and Route Permit Application, Section 9.2.3.

Potential Impacts

Potential noise impacts from the project can be grouped into three categories: (1) noise due to construction, and noise due to operation of the (2) transmission line and (3) substations. For each of these categories, noise impacts are anticipated to be minimal.

Construction Noise

Construction noise is expected to occur during daytime hours as the result of heavy equipment operation and increased vehicle traffic associated with the transport of construction personnel and supplies. Any exceedances of the MPCA daytime noise limits would be temporary in nature and no exceedances of the MPCA nighttime noise limits are expected for the project.

Table 7. Minnesota Noise Standards¹⁷⁰

Noise Area Classification (NAC)	Daytime		Nighttime	
	L ₅₀	L ₁₀	L ₅₀	L ₁₀
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Transmission Line Noise

Noise from transmission lines (electrical conductors) is due to small electrical discharges which ionize surrounding air molecules. This phenomenon is known as corona. The level of noise from these discharges depends on conductor conditions, voltage levels, and weather conditions. Noise emissions are greatest during heavy rains, when conductors are consistently wet. However, during heavy rains, the background noise level is usually greater than the noise from the transmission line and few people are in close proximity to the transmission line in these conditions. As a result, audible noise is not noticeable during heavy rains.

In foggy, damp, or light rain conditions, transmission line may produce audible noise higher than background levels. During dry weather, noise from transmission lines is an imperceptible, sporadic crackling sound. The applicants modeled and estimated noise levels for the project’s transmission line (Table 8).¹⁷¹ This modeling indicates that the noise level from the new 115 kV line will be approximately 18 dBA at the edge of the transmission line ROW and 19 dBA directly under the line. These noise levels are within Minnesota noise standards (i.e., < 50 dBA), and less than ambient noise levels in the project area.

¹⁷⁰ Minnesota Rules 7030.0040, <https://www.revisor.leg.state.mn.us/rules/?id=7030.0040>. Standards expressed in dBA. Day time is 7:00 a.m. – 10:00 p.m.; night time is 10:00 p.m. – 7:00 a.m.

¹⁷¹ CN and Route Permit Application, Section 9.2.3.

Table 8. Estimated Transmission Line Noise Levels¹⁷²

Location	L ₅ (dBA)	L ₅₀ (dBA)
Edge of Right-of-Way	17.7	14.2
Directly Under the Line	18.8	15.3

Substation Noise

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

The project includes three new substations (Straight River, Blueberry, Red Eye), all of which will include new transformers. The applicants modeled and estimated noise levels for each of the substations (**Table 9**).¹⁷³ The noise level at the nearest residence to each of the substations is estimated to be 25 dBA or less.¹⁷⁴ This noise level is within Minnesota noise standards (i.e., < 50 dBA), and less than ambient noise levels in the project area.

Table 9. Estimated Substation Noise Level at Nearest Residence¹⁷⁵

Substation	Noise Level (dBA)
Straight River	24
Blueberry	25
Red Eye	22

Mitigation

Noise impacts from the project are anticipated to be minimal and within Minnesota noise standards. Commission permits require compliance with these standards (**Appendices B and C**). However, this does not mean that noise impacts would not occur. Operation of the transmission line and of the substations will introduced new noises to the project area. Even if noise levels are within state standards, in certain situations (e.g., a person walking near a substation on a calm evening) these noises may be heard by residents in the project area. The primary means of mitigating noise impacts is routing to avoid areas where residents live, work, and congregate. Noise impacts associated with substations can be mitigated by natural or build sound barriers, e.g., berms, plantings.

¹⁷² CN and Route Permit Application, Section 9.2.3, Table 9-4. Estimates are for corona-generated noise during worst case conditions (heavy rain).

¹⁷³ CN and Route Permit Application, Section 9.2.3.

¹⁷⁴ Id.

¹⁷⁵ Id.

Displacement

Displacement is the removal of a residence or building to facilitate the operation of a transmission line. In general, no residences or buildings are allowed within the ROW for a transmission line. The ROW is established to ensure safe operation of the line.¹⁷⁶ Displacements are relatively rare and are more likely to occur in densely populated areas.

There are no residences or non-residential buildings within the anticipated ROW for the project, i.e., within 50 feet of the anticipated alignment (**Table 7**).

Potential Impacts

As there are no residences or non-residential buildings within the anticipated ROW for the project, no displacements are anticipated as a result of the project.

Mitigation

No displacements are anticipated as a result of the project; thus, no mitigation measures are proposed.

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:¹⁷⁷

- 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.

¹⁷⁶ CN and Route Permit Application, Section 9.2.2.

¹⁷⁷ 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.

A recent literature review examined 17 studies on the relationship between transmission lines and property values.¹⁷⁸ The reviewers concluded that the studies indicate small or no effects on the sale price of properties due to the presence of transmission lines.¹⁷⁹

Potential Impacts

Impacts to property values due to the project are anticipated to be minimal. For that segment of the project from the Hubbard substation to the Straight River substation, any property value impacts from the project would be incremental – the project replaces an existing 34.5 kV line. The new 115 kV line will introduce taller structures (and more conductors from the Hubbard substation to County Road 115), and these elements will slightly change the aesthetics in the project area. It is not anticipated that this change in aesthetics will appreciably impact property values.

For that portion of the project between the Straight River substation and the Red Eye substation, the applicants' proposed route follows existing roadway ROW. This use of existing ROW minimizes aesthetic impacts and impacts to property values. However, residences are oftentimes constructed near or along roadways, and the proximity of a residence to a transmission line is a factor in potential property value impacts. Thus, though property value impacts may be minimized by use of existing ROW, they may still occur.

Mitigation

Impacts to property values can be mitigated by reducing aesthetic impacts, perceived EMF health risks, and agricultural impacts. Selecting routes and alignments that place the transmission line away from residences and out of agricultural fields could address these concerns, thus minimizing impacts to property values. Use of existing ROW minimizes aesthetic impacts and impacts to property values. Property value impacts can also be mitigated through inclusion of specific conditions in individual easement agreements with landowners along the route.

Economics

The Menahga Area project will take several months to construct and will employ 15 to 20 general and specialized construction workers.¹⁸⁰ This construction employment will be temporary; no additional permanent jobs are anticipated as a result of the project.

Potential Impacts

Economic impacts resulting from the project will be primarily positive with an influx of wages and expenditures at local businesses during the construction of the project. Communities near the project will likely experience short-term positive economic impacts through the use of hotels, restaurants, and other services by the various workers.¹⁸¹ Expenditures for equipment, fuel, and other supplies and services will benefit businesses in the project area. Indirect positive impacts will accrue due to the improved reliability and load-serving capability of the electrical system.¹⁸²

¹⁷⁸ 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](http://www.real-analytics.com/Transmission%20Lines%20Lit%20Review.pdf).

¹⁷⁹ Id.

¹⁸⁰ CN and Route Permit Application, Section 4.8.

¹⁸¹ CN and Route Permit Application, Section 9.2.5.

¹⁸² Id.

Potential negative economic impacts are anticipated to be minimal. Disruptions of local business due to construction of the project are anticipated to be minimal. Though the population below the poverty level in the project area, as a percentage of residents, is relatively greater than the state average (**Table 5**), no low-income or minority population is anticipated to be negatively and differentially impacted by the project.

Mitigation

Economic impacts resulting from the project are anticipated to be primarily positive; thus, no mitigation measures are proposed.

Cultural Values

Cultural values are those community beliefs and attitudes which provide a framework for community unity and animate community actions. Cultural values are informed, in part, by ethnic heritage. Residents in the project area are comprised of German, Norwegian, Swedish, and Finnish heritage.¹⁸³ Cultural values are also informed by the work and recreation of residents (e.g., logging and hunting) and by geographical features (e.g., river, lakes). Hubbard County hosts events such as the Tamarac Fall Festival and Legends and Logging Days.¹⁸⁴ Wadena County hosts events such as St. Urho Days and the Red Eye River Celebration.¹⁸⁵

Potential Impacts

No impacts to cultural values are anticipated as a result of the project. The project will not adversely impact the work or recreation of residents in the project area that underlie the area's cultural values. Nor will it adversely impact geographical features that inform these values.

Mitigation

No impacts to cultural values are anticipated as a result of the project; thus, no mitigation measures are proposed.

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.

No impacts to electronic devices are anticipated as a result of the 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**).

Radio Interference

Corona from transmission line conductors can generate electromagnetic noise in the radio frequency range (**Figure 11**). This noise may cause interference with radio communications. Amplitude modulation (AM) radio interference typically occurs immediately under a transmission line and

¹⁸³ CN and Route Permit Application, Section 9.2.6.

¹⁸⁴ Id.

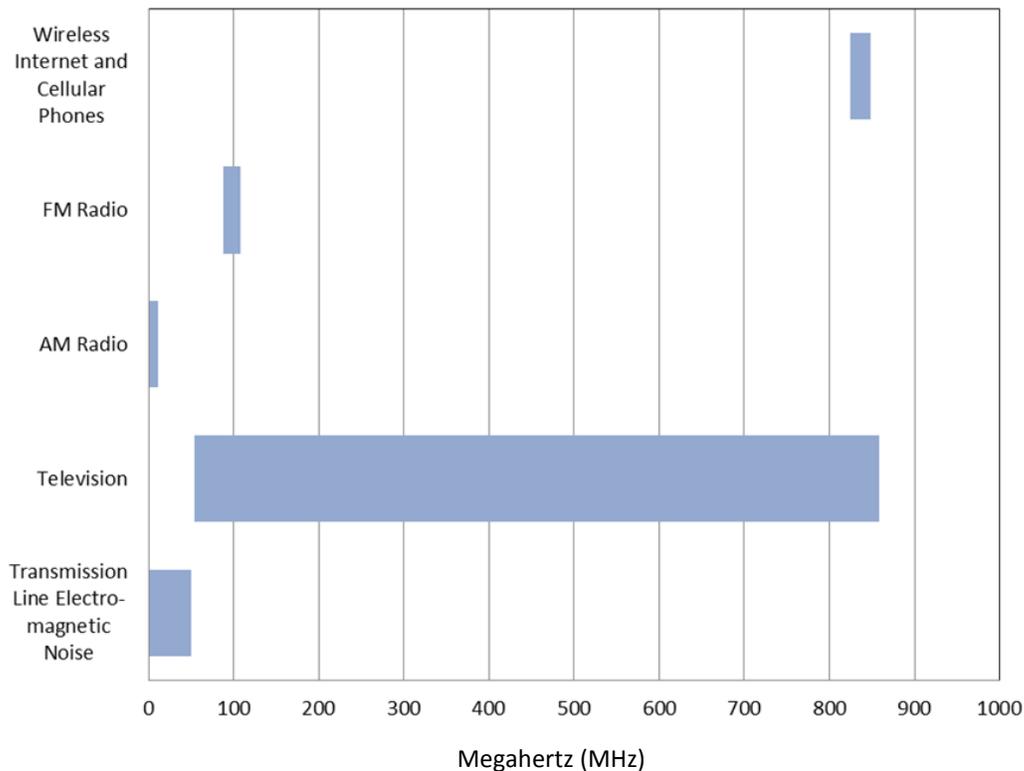
¹⁸⁵ Id.

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.¹⁸⁶

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 11**). Additionally, the interference rejection properties inherent in FM radio systems make them virtually immune to electromagnetic noise.¹⁸⁷

Two-way radios used for emergency services typically operate at frequencies greater than 150 MHz.¹⁸⁸ Minnesota is currently moving to a statewide emergency communications system that operates at 800 MHz.¹⁸⁹ Corona-generated electromagnetic noise is minimal at these frequencies (**Figure 11**).

Figure 11. Frequencies of Electronic Communications Compared with Frequencies of Transmission Line Electromagnetic Noise¹⁹⁰



¹⁸⁶ Id.

¹⁸⁷ Id.

¹⁸⁸ Emergency Medical Services Regulatory Board, EMS Radio Project, <http://www.emsrb.state.mn.us/comm.asp>.

¹⁸⁹ Id.

¹⁹⁰ High Voltage and Electrical Insulation Engineering, Arora and Mosch, 2011; How the Radio Spectrum Works, <http://www.howstuffworks.com/radio-spectrum1.htm>.

Potential Impacts

Impacts to radios due to the project are anticipated to be minimal.

Mitigation

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

Television

Potential interference with television broadcasts depends on how broadcasts are transmitted and received, e.g., analog, digital, satellite, cable.

Analog and digital television transmissions occur at frequencies greater than 54 MHz.¹⁹¹ These frequencies are high enough to avoid interference with corona-generated electromagnetic noise (**Figure 11**). Additionally, digital transmissions are not dependent on waveforms to transfer broadcast content, but rather on packets of binary information, which, in general, are less susceptible to corruption and can be corrected for errors. Analog transmissions can be subject to multipath reflections that result in a ghosting effect. Digital transmissions are susceptible to freezing and pixelation due to multipath reflections and/or low signal strength.

Satellite television is transmitted in the K_u band of radio frequency (12-18 GHz) and is not susceptible to corona-generated noise.¹⁹² Satellite television is susceptible to line-of-sight obstruction. Even minor obstructions, e.g., rain, can cause loss of signal. If the obstruction is removed, the signal interference will be removed and the broadcast unaffected.

Cable is a redistributed form of satellite broadcast and is generally not susceptible to interference due to the use of shielded coaxial cable. Cable broadcasts can suffer interference if the satellite broadcast suffers interference, e.g., line-of-sight obstruction.

Potential Impacts

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

Mitigation

Potential impacts to television broadcasts can be mitigated through several means. Use of a different antenna or moving an antenna / satellite dish will typically resolve any impacts. Commission permits requires permittees to mitigate impacts and to restore reception to pre-project quality (**Appendices B and C**).

Internet and Cellular Phones

Wireless internet and cellular phones use frequencies in the ultra-high frequency range (900 MHz and greater). The specific UHF frequency used for a cellular phone would depend on the phone service provider's technology. UHF radio frequencies are high enough that the impacts of corona-generated

¹⁹¹ North American Broadcast Television Frequencies, http://en.wikipedia.org/wiki/North_American_broadcast_television_frequencies.

¹⁹² Satellite Television, http://en.wikipedia.org/wiki/Satellite_television.

noise would be negligible (**Figure 11**). Accordingly no impacts to wireless internet systems and cellular phones are anticipated, and no mitigation measures are proposed.

Zoning and Land Use Compatibility

Transmission lines have the potential to adversely impact existing land uses and to be incompatible with future land uses. Impacts to existing and future land uses as a result of the project are anticipated to be minimal.

Land types in the project area include forest, croplands, wetlands, lakes, and rivers (**Appendix E**, Map E1). Because of the area's forest and lakes, forestry and tourism are important economic activities. Agriculture is also common in the project area. Built infrastructure in the project area includes cities, roads, and utilities. Most residences are single family dwellings; residences and farmsteads are generally scattered throughout the project area along county roads.¹⁹³ The greatest amount of residential development in the past 10 years has occurred around the city of Menahga in Blueberry Township.¹⁹⁴

The project area is generally zoned for agricultural use and mixed agriculture and forestry use.¹⁹⁵ Select areas near the city of Menahga are zoned for business and suburban residence.¹⁹⁶ Lakes, watercourses, and riparian areas are zoned as shoreland.¹⁹⁷

There are several cemeteries in the project area.¹⁹⁸ The Alajoki Cemetery is located along the applicants' proposed route in Section 18 of Blueberry Township, Wadena County (**Figure 12**). The transmission line's anticipated alignment, on the east side of Wadena Line Rd., would cross the front edge of the cemetery (**Appendix D**, Map Sheet 13). Mr. Roger Alajoki has indicated that the cemetery will be expanding in the near future by 75 feet to the north along Wadena Line Rd.¹⁹⁹

Potential Impacts

Impacts to existing land uses due to the project are anticipated to be minimal. The project is generally compatible with current and future land uses. The applicants' proposed route utilizes existing transmission line and roadway ROW to minimize impacts to land uses. The project would impact the Alajoki Cemetery. Transmission line conductors across the front edge of the cemetery would impact the aesthetics of the cemetery. Transmission line structures, were they placed along the front edge of the existing cemetery or its future expansion, would more significantly impact the aesthetics of the cemetery and could frustrate, to some extent, access to the cemetery and/or the approachability of the cemetery for visitors.

¹⁹³ Wadena County Comprehensive Plan, 2013, <http://www.co.wadena.mn.us/213/Planning-Zoning>.

¹⁹⁴ Id.

¹⁹⁵ CN and Route Permit Application, Section 9.3.

¹⁹⁶ Id.

¹⁹⁷ Id.

¹⁹⁸ Wadena County Historical Society, Wadena County Cemeteries, <http://wadenacountyhistory.org/cemeteries>.

¹⁹⁹ Comment Letter of Mr. Roger Alajoki, Written Comments on Scope of Environmental Assessment, April 14, 2015, eDockets Number [20154-109244-02](https://www.dockets.org/20154-109244-02).

Figure 12. Alajoki Cemetery²⁰⁰



Mitigation

Impacts to current and future land uses due to the project can be mitigated by selecting routes and alignments that are compatible, to the extent possible, with zoning and land use plans. Land use impacts can also be mitigated by minimizing aesthetic impacts of the project, to the extent that zoning and land use plans address aesthetics, e.g., landscaping. Impacts to the Alajoki Cemetery could be mitigated by placing transmission line structures on either side of the cemetery, i.e., by not placing a structure along the front edge of the existing cemetery or its future expansion.

5.4 Public Health and Safety

Transmission line projects have the potential to negatively impact public health and safety – during construction and operation of the project. As with any project involving heavy equipment and high voltage transmission lines, there are safety issues to consider during construction. Potential health and safety impacts include injuries due to falls, equipment use, and electrocution. Potential health impacts related to the operation of the project include health impacts from electric and magnetic fields (EMF), stray voltage, ozone emissions, and electrocution.

Impacts to public health and safety resulting from the Menahga Area 115 kV project are anticipated to be minimal. No adverse health impacts due to EMF, stray voltage, or air emissions are anticipated. The

²⁰⁰ View looking northeast across Wadena Line Rd.

new 115 kV line will have protective devices to safeguard the public from the line if an accident occurred and a structure or conductor fell to the ground.²⁰¹ These protective devices are circuit breakers and relays located within connecting substations. The protective equipment would de-energize the transmission line, should such an event occur.

Electric and Magnetic Fields (EMF)

Electric and magnetic fields (EMF) are invisible regions of force resulting from the presence of electricity. Naturally occurring EMF are caused by the earth’s weather and geomagnetic field. Man-made EMF are caused by any electrical device and found wherever people use electricity (**Table 10**). EMF are characterized and distinguished by their frequencies, i.e., the rate at which the fields change direction each second. All electrical lines in the United States have a frequency of 60 cycles per second or 60 Hertz (Hz). EMF at this frequency level are known as extremely low frequency EMF (ELF-EMF).

Electric fields are created by the electric charge (i.e., voltage) on a transmission line. Electric fields are solely dependent upon the voltage of a line (volts), not the current (amps). Electric field strength is measured in kilovolts per meter (kV/m). The strength of an electric field decreases rapidly as the distance from the source increases. Electric fields are easily shielded or weakened by most objects and materials, such as trees and buildings.

Magnetic fields are created by the electrical current moving through a transmission line. The magnetic field strength is proportional to the electrical current (amps). Magnetic field strength is typically 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. Typical Magnetic Fields (milliGauss, mG) of Common Appliances²⁰²

Source	Distance from Source			
	0.5 foot	1 foot	2 feet	4 feet
Baby Monitor	6	1	-	-
Computer Displays	14	5	2	-
Fluorescent Lights	40	6	2	-
Copy Machines	90	20	7	1
Microwave Ovens	200	4	10	2
Vacuum Cleaner	300	60	10	1

²⁰¹ CN and Route Permit Application, Section 9.2.1.

²⁰² EMF Electric and Magnetic Fields Associated with the Use of Electric Power, National Institute of Environmental Health Sciences, 2002, [hereinafter NIEHS 2002 Summary]
http://www.niehs.nih.gov/health/assets/docs_p_z/results_of_emf_research_emf_questions_answers_booklet.pdf.

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.²⁰³ 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,²⁰⁴ the World Health Organization,²⁰⁵ the Scientific Committee on Emerging and Newly Identified Health Risks,²⁰⁶ and the Minnesota State Interagency Working Group on EMF Issues (MSIWG).²⁰⁷ 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.
- Because a cause and effect relationship cannot be established, and yet an association between childhood leukemia and EMF exposure has been shown, there is:
 - (1) Uncertainty as to the potential health effects of EMF,
 - (2) No methodology for estimating health effects based on EMF exposure,
 - (3) A need for further study of the potential health effects of EMF,
 - (4) A need for a prudent avoidance approach in the design and use of all electrical devices, including transmission lines.

Regulations and Guidelines

There are currently no federal regulations regarding allowable electric or magnetic fields produced by transmission lines in the United States. A number of states have developed state-specific regulations for electric and magnetic fields due to transmission lines (**Table 11**). Additionally, a number of international organizations have adopted standards for electric and magnetic fields (**Table 12**).

The Minnesota Public Utilities Commission has established a standard that limits the maximum electric field under transmission lines to eight (8) kV/m. All transmission lines in Minnesota must meet this standard. The Commission has not adopted a magnetic field standard for transmission lines. 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).

²⁰³ Id.

²⁰⁴ National Institute of Environmental Health Sciences, Electric and Magnetic Fields, <http://www.niehs.nih.gov/health/topics/agents/emf/>.

²⁰⁵ World Health Organization, Electromagnetic Fields, <http://www.who.int/peh-emf/en/>.

²⁰⁶ Scientific Committee on Emerging and Newly Identified Health Risks, http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_022.pdf.

²⁰⁷ 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].

Table 11. State Electric and Magnetic Field Standards²⁰⁸

State	Electric Field (kV/m)		Magnetic Field (mG)
	Within Right-of-Way	Edge of Right-of-Way	Edge of Right-of-Way
Florida	8 ^a	2	150 ^a (max load)
	10 ^b	---	200 ^b (max load)
	---	---	250 ^c (max load)
Massachusetts	---	---	85 ^g
Minnesota	8	---	---
Montana	7 ^d	1 ^e	---
New Jersey	---	3	---
New York	11.8	1.6	200 (max load)
	11 ^f	---	---
	7 ^d	---	---
Oregon	9	---	---

^a 69 kV to 230 kV transmission lines

^b 500 kV transmission lines

^c 500 kV transmission lines on certain existing ROW

^d Maximum for highway crossing

^e May be waived by the landowner

^f Maximum for private road crossings

^g A level above 85 mG is not prohibited, but may trigger a more extensive review of alternatives.

²⁰⁸ NIEHS, Electric and Magnetic Fields Associated with the Use of Electric Power, Questions and Answers, p. 46, http://www.niehs.nih.gov/health/assets/docs_p_z/results_of_emf_research_emf_questions_answers_booklet.pdf

Table 12. International Electric and Magnetic Field Guidelines²⁰⁹

Organization	Electric Field (kV/m)		Magnetic Field (mG)	
	General Public	Occupational	General Public	Occupational
IEEE	5	20	9,040	27,100
ICNIRP	4.2	8.3	2,000	4,200
ACGIH	---	25	---	10,000/1,000 ^a
NRPB	4.2	---	830	4,200

IEEE – Institute of Electrical and Electronics Engineers, ICNIRP – International Commission on Non-Ionizing Radiation Protection, ACGIH – American Conference of Industrial Hygienists, NRPB – National Radiological Protection Board

^a for persons with cardiac pacemakers or other medical electronic devices.

Potential Impacts

No adverse health impacts from electric or magnetic fields are expected for persons living or working near the project. The applicants have modeled and calculated the electric and magnetic fields associated with the project. The calculated maximum electric field for project is 2.49 kV/m at the transmission line centerline and 0.21 kV/m at the edge of the transmission line ROW (**Table 13**). These calculated electric fields are less than the standard prescribed by the Commission (8 kV/m). Electric fields where there is underbuilding of an existing distribution line and where there is proposed double circuiting (Hubbard substation to County Road 115) are similar to those produced by a single circuit 115 kV line (**Table 13**).

The calculated maximum magnetic field for the project with an average electrical load is 18.61 mG at the transmission line centerline, and 4.92 mG at the edge of the transmission line ROW (**Table 14**). Electrical loads vary throughout the day and throughout the year; thus, magnetic fields will also vary. Loads are highest in the project area between November and March.²¹⁰ A peak electric load can be estimated by examining current electrical demand variation and trends. The calculated magnetic field for the project with a peak electrical load is 28.52 mG at the transmission line centerline, and 7.64 mG at the edge of the transmission line ROW (**Table 14**). Magnetic fields where there is underbuilding of an existing distribution line and where there is proposed double circuiting (Hubbard substation to County Road 115) are similar to those produced by a single circuit 115 kV line (**Table 14**).

The calculated magnetic fields for the project, for all transmission line configurations and loading scenarios, are less than 30 mG directly under the transmission line and less than 8 mG at the edge of the transmission line ROW. These fields are below all state and international standards that have been developed for magnetic fields. Accordingly, based on the scientific evidence to date, no adverse health impacts from electric or magnetic fields are expected for persons living or working near the project.

²⁰⁹ Id.; ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100kHz), 2010, <http://www.icnirp.org/documents/LFgdl.pdf>; NRPB guidelines are the 1998 ICNIRP guidelines. The NRPB became the Health Protection Agency (HPA) in 2004,

http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1254510609795?p=1219908766891;

ACGIH, Documentation of the Threshold Limit Values for Physical Agents, 7th Edition,

<http://www.acgih.org/store/ProductDetail.cfm?id=654>.

²¹⁰ CN and Route Permit Application, Section 5.5.1, Table 5-4.

Mitigation

No health impacts due to EMF are anticipated from the Menahga Area 115 kV 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 that facilitate phase cancellation between circuits.²¹¹

The applicants' proposed route for the project attempts to place the new 115 kV line away from residences such that EMF exposure levels are minimized.²¹² Alternative routes that may place the line relatively farther away from residences, thus further lowering EMF exposure levels, are discussed in Section 6.

²¹¹ MSIWG White Paper on EMF Issues.

²¹² CN and Route Permit Application, Section 9.2 (noting the applicants' attempts to avoid residences and businesses to the extent practicable).

Table 13. Calculated Electric Fields (kV/m)²¹³
(3.28 feet above ground)

Transmission Line	Distance from Centerline (feet)								
	-300	-100	-50	-25	0	25	50	100	300
Single Circuit 115 kV Line	0.01	0.06	0.21	0.49	1.40	0.65	0.19	0.07	0.01
Single Circuit 115 kV Line with 7.2 kV Underbuild	0.01	0.06	0.20	0.36	0.70	0.49	0.18	0.06	0.01
Double Circuit 115 kV Line	0.01	0.09	0.08	0.66	2.49	0.66	0.08	0.09	0.01

Table 14. Calculated Magnetic Fields (mG)²¹⁴
(3.28 feet above ground)

Transmission Line / Loading	Current (amps)	Distance from Centerline (feet)								
		-300	-100	-50	-25	0	25	50	100	300
Single Circuit 115 kV Line / Average Load	80	0.10	0.79	2.51	5.76	11.55	6.82	2.86	0.85	0.10
Single Circuit 115 kV Line / Peak Load	110	0.13	1.08	3.45	7.92	15.88	9.38	3.94	1.17	0.14
Single Circuit 115 kV Line with 7.2 kV Underbuild / Average Load	80/17	0.36	1.31	3.30	6.51	11.83	8.54	4.51	1.79	0.43
Single Circuit 115 kV Line with 7.2 kV Underbuild / Peak Load	110/26	0.55	1.94	4.76	9.36	17.11	12.35	6.54	2.63	0.65
Double Circuit 115 kV Line / Average Load	80/82	0.18	1.53	4.92	11.11	18.61	11.06	4.90	1.52	0.18
Double Circuit 115 kV Line / Peak Load	110/138	0.28	2.36	7.64	17.33	28.52	16.62	7.38	2.31	0.28

²¹³CN and Route Permit Application, Section 8.7, Table 8-1.

²¹⁴CN and Route Permit Application, Section 8.7, Table 8-3.

Implantable Medical Devices

Implantable medical devices such as pacemakers, defibrillators, neurostimulators, and insulin pumps are electromechanical devices and may be subject to interference from electric and magnetic fields. Most of the research on electromagnetic interference and medical devices is related to pacemakers.

Pacemakers are more sensitive to electric fields than to magnetic fields.²¹⁵ In laboratory tests, the earliest interference from magnetic fields in pacemakers was observed at 1,000 mG, a field strength greater than that associated with high voltage transmission lines.²¹⁶ 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, have indicated that electric fields less than 6 kV/m are unlikely to cause interactions affecting operation of modern bipolar devices. Older unipolar designs, however, are more susceptible to interference from electric fields, with research suggesting that the earliest evidence of interference occurred in electric fields ranging from 1.2 to 1.7 kV/m.²¹⁷

Potential Impacts

The calculated maximum electric field strength for the project is 2.49 kV/m. This field strength is below the 6 kV/m interaction level for modern, bipolar pacemakers, but above the range of interaction for older, unipolar pacemakers. Electric fields decrease with distance and the calculated maximum field strength at the edge of the transmission line ROW is 0.21 kV/m. This field strength is below the range of interaction for older, unipolar pacemakers. Accordingly, impacts to implantable medical devices and their users resulting from the project are anticipated to be minimal.

Mitigation

No impacts to implantable medical devices and persons using these devices are anticipated from the project; thus, no mitigation measures are proposed.

Stray Voltage

Stray voltage is an extraneous voltage that appears on metal surfaces in buildings, barns and other structures that are grounded to earth. This voltage is also called a neutral-to-earth voltage. Stray voltage is typically experienced by livestock who come into contact with one or more metal objects on a farm (e.g., feeders, waterers, stalls). Livestock, by virtue of standing on the ground, are grounded to earth. Metal objects on a farm are grounded to earth through electrical connections. If there is a voltage between the livestock and these objects, a small current will flow through the livestock.

The fact that the livestock and the metal objects are grounded to the same place (earth) would seem to prevent any voltage from existing between them. However, this is not the case – a number of factors

²¹⁵ Electric Power Research Institute (EPRI), 2004, Electromagnetic Interference with Implanted Medical Devices.

²¹⁶ Id.

²¹⁷ 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.

determine whether a metal object is, in fact, grounded. These include wire size and length, the quality of connections, the number and resistance of ground rods, and the current being grounded.²¹⁸ Likewise, a number of factors also determine the extent to which livestock are grounded, e.g., standing on wet versus dry ground, the electrical resistance of the livestock.²¹⁹ Because stray voltage results from a difference in the effectiveness of grounding and on the resulting electrical currents, it can exist at any business, house, or farm which uses electricity, independent of whether there is a transmission line nearby.

Stray voltage, if prevalent in an agricultural operation, can affect livestock health. Stray voltage has primarily been raised as a concern on dairy farms because of its potential to affect milk production and quality. Stray voltage 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.

Potential Impacts

No impacts due to stray voltage are anticipated from the project. The project is a 115 kV transmission line that does not directly connect to businesses or residences in the project area, and does not change local electrical service. However, transmission lines, where they parallel distribution lines can, in the immediate area of the paralleling, cause current to flow on these lines (additional current, as the distribution lines already carry current). For distribution lines and electrical service that are properly wired and grounded, these additional currents are of no matter. However, for distribution lines and electrical service that are not properly wired and grounded, these additional currents could create stray voltage impacts.

The new 115 kV line will, in some areas of the project, parallel existing distribution lines. This arrangement could create additional currents on the distribution line in the immediate area of the paralleling. These currents are not anticipated to cause any stray voltage issues in the project area. If, however, there is not proper grounding or wiring on the distribution system or at a nearby residence, business, or farm, these currents could point up this insufficiency.

Mitigation

Stray voltage impacts due to the project are not anticipated. However, in those areas where the new 115 kV line could induce currents on inadequately grounded distribution circuits, mitigation measures may be required. Mitigation measures for stray voltage tend to be site specific but include phase cancellation, transmission-to-distribution separation, isolation of the end-user neutral, and improved grounding. The applicants indicate that if any 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.²²⁰

Induced Voltage

The electric field from a transmission line can reach a nearby conductive object, such as a vehicle or a metal fence, which is in close proximity to the line. This may induce a voltage on the object, which is dependent on many factors, including object shape, size, orientation, capacitance, and location along the right-of-way. If the objects upon which a voltage is induced are insulated or semi-insulated from the

²¹⁸ Stray Voltage, NDSU Extension Publication #108, <http://www.ag.ndsu.edu/extension-aben/epq/files/epq108.pdf>.

²¹⁹ Id.

²²⁰ CN and Route Permit Application, Section 8.8.

ground and a person touches them, a small current would pass through the person's body to the ground. This touch may be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person.

The primary concern with induced voltage is the current that flows through a person to the ground when touching the object, not the voltage. Most shocks from induced current are considered more of a nuisance than a danger, but to ensure the safety of persons in the proximity of high-voltage transmission lines, the NESC requires that any discharge be less than 5 milliAmperes (mA). In addition, the Commission's electric field limit of 8 kV/m is designed to prevent serious hazard from shocks due to induced voltage under high voltage transmission lines. Proper grounding of metal objects under and/or adjacent to transmission lines is the best method of avoiding these shocks.

Potential Impacts

No impacts due to induced voltage are anticipated from the project. The new 115 kV line may induce a voltage on insulated metal objects near the transmission line ROW. However, this voltage and associated electrical current are limited by Commission route permits. Commission permits require that transmission lines be constructed and operated to meet NESC standards and the Commission's electric field limit of 8 kV/m (**Appendices B and C**). Accordingly, impacts due to induced voltage are not anticipated.

Mitigation

No impacts due to induced voltage are anticipated from the project; thus no mitigation measures are proposed. Any potential impacts will be mitigated by Commission permit requirements regarding grounding, NESC discharge limits, and the Commission's electric field limit of 8 kV/m (**Appendices B and C**).

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.²²¹ Air quality in the project area is relatively better than more populated areas of the state, e.g., Minneapolis and St. Paul.²²² 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 (O₃) 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.²²³ 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).²²⁴ The

²²¹ 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>.

²²² AirCompare – County Comparisons, <http://www.epa.gov/aircompare/compare.htm>.

²²³ Six Common Air Pollutants, U.S. Environmental Protection Agency, <http://www.epa.gov/air/urbanair/>.

²²⁴ Minnesota Rules 7009.0800, <https://www.revisor.mn.gov/rules/?id=7009.0080>.

federal ozone limit is 0.075 ppm.²²⁵ Ozone and nitrous oxide emissions from the new 115 kV line are anticipated to be well below these limits.²²⁶

Construction Dust

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 temporary.

Potential Impacts

No significant impacts to air quality are anticipated from the project. Ozone and nitrous oxide emissions are anticipated to be less than state and federal standards. Emissions of these compounds will increase airborne concentrations of ozone and nitrous oxide in the project area and the state; however, the impact of these emissions will be relatively minor.²²⁷ Impacts due to construction dust are anticipated to be minor and temporary.

Mitigation

No significant impacts to air quality are anticipated from the project; thus, no mitigation measures are proposed. The applicants indicate they will use dust control measures to minimize dust created during the construction of the project.²²⁸

5.5 Public Services

Transmission line projects have the potential to negatively impact public services, e.g., roads, utilities, and emergency services. These impacts are typically temporary in nature, e.g., the inability to fully use a road or utility while construction is in process. However, impacts can be more long term if they change the project area in such a way that public service options are foreclosed or limited.

Temporary impacts to public services resulting from the project are anticipated to be minimal. Long-term impacts to public services are not anticipated.

Roads and Highways

The primary road in the project area is U.S. Route 71, which runs roughly north-south in the project area and passes through the city of Menahga. State Highway 87 runs generally in an east-west fashion and also passes through Menahga. The applicant's proposed route crosses U.S. Route 71 and State Highway 87. The applicant's proposed route also parallels a number of county roads and county state aid highways. As discussed in Section 3.2, the applicants indicate that new transmission line poles will generally be placed 3 to 7 feet outside of existing road rights-of-way.

The applicants must obtain permits and approvals from the Minnesota Department of Transportation (MnDOT) for the crossings of state and federal highways (see **Table 1**). The applicants are also required

²²⁵ Ground-level Ozone, U.S. Environmental Protection Agency, <http://www.epa.gov/glo/actions.html>.

²²⁶ CN and Route Permit Application, Section 9.6.1.

²²⁷ Nitrogen Oxides, http://www.epa.gov/cgi-bin/broker?polchoice=NOX& debug=0& service=data& program=dataprog.national_1.sas (noting that transmission lines are not a primary sources of nitrogen oxide emissions).

²²⁸ CN and Route Permit Application, Section 9.6.1

to comply with MnDOT's accommodation policy for the placement of utilities along and across state highways.²²⁹

Potential Impacts

Impact to roads and highways due to the project are anticipated to be minimal and temporary. Minor, temporary impacts to roads may occur during construction of the project, e.g., temporary traffic redirection, temporary traffic delays.²³⁰ No impacts to roads and highway are anticipated after the project has been constructed.

Mitigation

Impacts to roads and highways can be mitigated through coordination with roadway authorities. Impacts can also be mitigated by the selection of routes, alignments, and pole placements that minimize interference with roadways. The applicants indicate that they will place structures outside of existing road rights-of-way.²³¹ The applicants indicate that construction equipment will be moved in a manner that avoids traffic congestion and minimizes safety risks.²³² The applicants note that they will work with roadway authorities to minimize obstructions and inconvenience to the traveling public.²³³ Where the transmission line will cross roadways, the applicants indicate they will use temporary guard structures to ensure that the lines, as they are being strung, do not interfere with traffic.²³⁴

Airports

There are three airports in the project area. The project is approximately five miles from the Park Rapids Municipal Airport in Park Rapids, approximately 15 miles from the Wadena Municipal Airport in Wadena, and approximately 16 miles from the New York Mills Municipal Airport in New York Mills, Minn.²³⁵

Potential Impacts

No impacts to airports are anticipated as a result of the project. Transmission line structures and conductors can conflict with the safe operation of airports if they are too tall for the applicable safety zones. Different classes of airports have different safety zones depending on several characteristics including runway dimensions, classes of aircraft accommodated, and navigation systems. These characteristics determine the necessary takeoff and landing glide slopes, which in turn determine the necessary setback distances for transmission line structures. Based on the height of the project's transmission line structures (60 to 90 feet) and the distances to local airports, no impacts to airport operations are anticipated.

Mitigation

No impacts to airports are anticipated as a result of the project; thus, no mitigation measures are proposed.

²²⁹ Minnesota Department of Transportation, Utility Agreements and Permits, <http://www.dot.state.mn.us/utility/policy/index.html>.

²³⁰ CN and Route Permit Application, Section 9.2.8.

²³¹ Id.

²³² Id.

²³³ Id.

²³⁴ Id.

²³⁵ Id.

Water Utilities

Potable water is provided in the project area primarily by local wells. The city of Menahga has a municipal water supply and sanitary sewer system.²³⁶

Potential Impacts

No impacts to water utilities are anticipated due to the project. Impacts could occur if transmission line structures damaged or impeded the use of wells, water supplies, or sanitary sewers. The applicants' proposed route proceeds primarily along roadways and is not anticipated to impact local wells. The proposed route does not enter the city of Menahga, thus no impacts to the city's water utilities are anticipated.

Mitigation

No impacts to water utilities are anticipated as a result of the project; thus, no mitigation measures are proposed.

Electric Utilities

Electrical service in the project area is provided by the Todd-Wadena electric cooperative. The Menahga Area 115 kV project proposes to construct a new 115 kV transmission line to relieve potential overloads on the existing 34.5 kV transmission system in the project area and to serve a proposed, new oil pumping station (Section 4.1). In locations where the new 115 kV line will displace an existing distribution line, the distribution line will be underbuilt on the new line or placed underground (Section 3.5).

Potential Impacts

The electrical transmission system in the project area will change as a result of the project, but no adverse impacts to electrical service are anticipated.

Mitigation

No adverse impacts to electric utilities are anticipated due to the project; thus, no mitigation measures are proposed.

Natural Gas Utilities

Natural gas service in the project area is provided by Minnesota Energy Resources (MER).²³⁷ MER operates natural gas facilities in the project area including an 8 inch gas pipeline that runs along the applicants' proposed route south of the Blueberry substation along 109th Ave. (**Appendix D**, Map Sheets 17-20).²³⁸

Potential Impacts

No impacts to natural gas service are anticipated as a result of the project. Applicants plan to place transmission line poles away from natural gas lines in the project area (see Section 3.2; **Figure 3B**). Such placement minimizes the chance that installation of the poles could impact a natural gas line.

²³⁶ Comprehensive Plan, City of Menahga, July 9, 2012, www.cityofmenahga.com.

²³⁷ Minnesota Energy Resources, Areas Served, <http://www.minnesotaenergyresources.com/company/area.aspx>.

²³⁸ Additional Project Information from Applicants.

Mitigation

No impacts to natural gas service are anticipated due to the project; thus, no mitigation measures are proposed.

Emergency Services

Emergency services in the project area are provided by county fire departments and rescue squads, ambulance services, and law enforcement.²³⁹ 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 project, there may be temporary impacts to roads which could impede responses to an emergency. However, these impacts are anticipated to be minimal (see discussion above). No impacts to emergency services are anticipated once the project is operational.

Mitigation

No impacts to emergency services are anticipated due to the project; thus, no mitigation measures are proposed.

5.6 Land-Based Economies

Transmission lines have the potential to impact land-based economies. Transmission lines and poles are a physical presence on the landscape. This presence 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. This limitation can create impacts for commercial businesses and forestry. Additionally, transmission line poles take up space on the ground that could be used for other purposes, e.g., agriculture, mining.

Impacts to land-based economies due to the project are anticipated to be minimal, with the exception of forestry. 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. There are gravel pits in the project area, but impacts to these pits are anticipated to be minimal as they can be avoided by prudent placement of the transmission line alignment and poles.

Agriculture

Agriculture is a land-based economic resource in the project area. Approximately 43 percent of Wadena County is in agricultural production; the average farm size in the county is 232 acres.²⁴⁰ Agricultural lands in the project area consist of croplands and grasslands (**Appendix E**, Map E1). Crops grown in the

²³⁹ See, e.g., Wadena County Communications Center, <http://www.co.wadena.mn.us/182/Communications>.

²⁴⁰ CN and Route Permit Application, Section 9.4.1.

area include corn, soybeans, hay crops, and vegetables.²⁴¹ Farms in the area raise a variety of livestock including beef and dairy cattle.²⁴²

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, e.g., soil compaction.

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 Menahga Area 115 kV project is approximately four square feet.²⁴³ 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. The applicants' proposed route crosses approximately 8.8 miles of agricultural land, which is about 39 percent of the length of the project.²⁴⁴ The transmission line ROW will cross approximately 182 acres of farmland.²⁴⁵ 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 1,500 square feet.²⁴⁶

If transmission line structures are placed along field edges, then the amount of agricultural land unavailable for cultivation will be limited to approximately 1,500 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. Within a field, a structure that takes up 4 square feet may obstruct an area five times as great. Thus, if all of the project's structures were within farm fields, approximately 9,000 square feet of agricultural land would be impacted. 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.

Temporary impacts, such as soil compaction and crop damage, may occur during construction of the 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 and follows existing infrastructure rights-of-way, field lines, and

²⁴¹ U.S. Department of Agriculture, Census of Agriculture, 2012, Minnesota Counties, http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota.

²⁴² Id.

²⁴³ CN and Route Permit Application, Section 9.4.1.

²⁴⁴ Id.

²⁴⁵ Additional Project Information from Applicants.

²⁴⁶ $22.5 \text{ miles} \times 5,280 \text{ feet/mile} \div 350 \text{ foot span/pole} \times 4 \text{ square feet/pole}$.

property lines. Where poles are placed in fields, impacts can be mitigated by not placing structures diagonally across field, but rather parallel to existing field lines.

Agricultural impacts can also be mitigated by construction and remediation measures. The applicants indicate that they will take the following measures to mitigate agricultural impacts from the project:²⁴⁷

- Limiting movement of crews and equipment to the transmission line ROW to the greatest extent possible.
- Repairing and restoring areas disturbed by construction to pre-construction contours so that all surface drain naturally.
- Repairing ruts and soil compaction; filling, grading, scarifying, harrowing, disking.
- Repairing damage to ditches, tile, terraces, roads, and other land features.
- Placing structures to avoid irrigation systems.
- Providing compensation to landowners for any crop and property damage.

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

Forestry

Forested lands are prevalent in the project area (**Appendix E**, Map E1). Approximately 44 percent of Wadena County is forested.²⁴⁸ Forest stands commonly include tamarack, white cedar, jack pine, sugar maple, basswood, and paper birch. Treed windbreaks and shelter belts are common near residences and along roadways and field edges (**Figure 13**).

Forested lands in the project area are routinely logged by the forestry industry and for personal use, e.g., home heating.²⁴⁹ In recent years, forested areas near the project area have been logged and converted to irrigated agricultural fields.²⁵⁰

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.

Potential Impacts

Impacts to forested areas and to forestry operations due to the project are anticipated to be moderate. The applicants' proposed route crosses approximately 4.7 miles of forested land.²⁵¹ The transmission line ROW will impact approximately 60 acres of forested land.²⁵² Unlike agricultural impacts, these impacts are permanent throughout the ROW.

²⁴⁷ CN and Route Permit Application, Section 9.4.1.

²⁴⁸ CN and Route Permit Application, Section 9.4.2.

²⁴⁹ CN and Route Permit Application, Section 9.4.2.

²⁵⁰ DNR Eyes Purchase of Wadena County Forest Land, Wadena Pioneer Journal, August 7, 2014, <http://www.wadenapj.com/content/dnr-eyes-purchase-wadena-county-forest-land-0>

²⁵¹ CN and Route Permit Application, Section 9.4.2.

²⁵² Additional Project Information from Applicants.

Figure 13. Treed Areas along Highway 87²⁵³



Impacts to windbreaks and shelter belts along the proposed route will vary depending on the alignment of the new 115 kV line, sharing of existing roadway and transmission ROW, and the relative density and height of these windbreaks and shelter belts.

Mitigation

Impacts to forested areas and to forestry operations can be avoided and mitigated by prudent routing and prudent placement of structures within the route – i.e., by avoiding forested areas. Where such areas cannot be avoided, impacts can be mitigated by new plantings that are compatible with the new 115 kV line.²⁵⁴ Impacts can also be mitigated by compensation to landowners for loss of forest resources.

Mining

There are several active gravel pits in the project area (**Appendix E, Map E2**). Impacts to gravel pits, and other types of mining operations, can occur when a transmission line interferes with access to and the ability to remove gravel or other mineral resources.

²⁵³ View looking west along Highway 87.

²⁵⁴ CN and Route Permit Application, Section 9.4.2.

Potential Impacts

Impacts to gravel pits in the project area due to the project are anticipated to be minimal. The applicants' proposed route and alignment for the project are near an active gravel pit in Section 30 of Blueberry Township and an inactive gravel pit in Section 31 of Blueberry Township (**Appendix D**, Map Sheets 16 and 18).²⁵⁵ At these locations, the applicant's proposed alignment is outside of the roadway ROW and near the perimeter of the gravel pits.²⁵⁶ Because the gravel pits must be setback from the roadway, it is anticipated the new 115 kV line can be placed between the pits and the roadway without impacting current or future gravel mining activities.

Mitigation

Impacts to gravel pits can be avoided by prudent routing and prudent placement of structures within the route – i.e., by avoiding gravel pits. Impacts can be mitigated by structure designs that allow for gravel extraction while maintaining safe operation of the line. Impacts can also be mitigated by compensation to landowners for loss of gravel resources.

Recreation and Tourism

The project is located in a relatively rural area with a diversity of recreation and tourism resources (**Appendix E**, Map E3). The project area includes parks, trails, lakes, rivers, and state wildlife management areas (WMAs).²⁵⁷ Lakes in the project area include Spirit Lake, Blueberry Lake, Stocking Lake, Twin Lakes, and Hinds Lake. These lakes have public accesses. Spirit Lake, in the city of Menahga, has a swimming beach and fishing pier. The Menahga Memorial Forest Park and Campground is located just south of the city of Menahga.²⁵⁸

Popular outdoor activities in the project area include fishing, hunting, boating, hiking, golfing, and snowmobiling.²⁵⁹ There are four WMAs in the project area – Lowe WMA, Red Eye WMA, Kitten Creek WMA, and Wood Eye WMA.²⁶⁰ These WMAs provide opportunities for viewing wildlife and their ecosystems.

Potential impacts to recreation and tourism can occur when a transmission line interferes with natural or man-made resources designed to provide these activities. For example, a transmission line could change the aesthetic or function of a recreational destination such that the number of visitors to the destination decreases.

Potential Impacts

Impacts to recreation and tourism as a result of the project are anticipated to be minimal. Recreational resources are, generally, away from the applicants' proposed route. The proposed route does pass near the Red Eye WMA; however, the new 115 kV line is not expected to impact use or enjoyment of the WMA. There will be aesthetic impacts in the project area due to the structures and conductors of the project (see Section 5.3). However, these impacts are not expected to impact recreation decisions made by citizens or their enjoyment of recreational resources in the project area.

²⁵⁵ CN and Route Permit Application, Section 9.4.4.

²⁵⁶ Id.

²⁵⁷ CN and Route Permit Application, Section 9.4.3.

²⁵⁸ Memorial Forest Campground, <http://www.cityofmenahga.com>.

²⁵⁹ CN and Route Permit Application, Section 9.4.3.

²⁶⁰ CN and Route Permit Application, Section 9.6.3.

Mitigation

Impacts to recreation and tourism can be mitigated by selecting routes and alignments that avoid recreational resources. Impacts could also be mitigated by limiting the aesthetic impact of structures, such that impacts to recreational activities are minimized – e.g., minimizing impacts to natural landscapes during construction.

5.7 Archaeological and Historic Resources

Transmission lines have the potential to impact archaeological and historic resources. Archaeological resources can be impacted by the disruption or removal of such resources during the construction of a line. Historic resources can be impacted by the placement of a line in a manner that impairs or decreases the historic value of the resource. Impacts to known archaeological and historic resources resulting from the project are anticipated to be minimal. Impacts to unknown archaeological resources are possible and a Phase I archaeological survey is recommended for the project by the Minnesota State Historic Preservation Office.²⁶¹

Potential Impacts

To determine potential impacts on known archaeological and historic resources, the applicants conducted a review of records at the Minnesota State Historic Preservation Office (SHPO).²⁶² The review indicated that there are eight previously recorded archaeological sites within one mile of the applicants' proposed route (**Appendix E**, Map E4).²⁶³ These sites include pre-contact earthworks and artifacts.²⁶⁴ None of these sites are within the proposed route.²⁶⁵ However, based on the review, there is a moderate to high potential that the proposed route will impact unrecorded archaeological sites, particularly in southern Hubbard County and northern Wadena County along the Shell River.²⁶⁶ Because of this potential, SHPO recommends that a Phase I archaeological survey be conducted for the project.²⁶⁷

The applicants' review of SHPO records also indicated that there are six previously recorded historic structures within one mile of the applicants' proposed route (**Appendix E**, Map E4).²⁶⁸ Five of these structures are outside of and fairly distant from the proposed route. The sixth structure is an abandoned school and town hall building located near the intersection of Highway 87 and 107th Ave.²⁶⁹ This building is within the proposed route but is not within the proposed transmission line ROW.²⁷⁰ Though the new 115 kV line will pass near this structure, it is not anticipated that the line will impact the historic value of this building.

Mitigation

The primary means of mitigating impacts to archaeological and historic resources is prudent routing, i.e., by avoiding known archaeological and historic resources. Impacts can also be avoided by prudent pole

²⁶¹ CN and Route Permit Application, Section 9.5.

²⁶² Id.

²⁶³ Id.

²⁶⁴ Id.

²⁶⁵ Id.

²⁶⁶ Id.

²⁶⁷ Id.

²⁶⁸ Id.

²⁶⁹ Id.

²⁷⁰ Id.

placement within a route such that resources are spanned or avoided. The applicants indicate that should archaeological sites or resources be identified during construction of the project, work will be stopped and SHPO staff consulted on how to proceed.²⁷¹ Consultation with SHPO concerning archaeological resources encountered during construction is a standard Commission route permit condition (see **Appendices B and C**).

5.8 Water Resources

Transmission lines have the potential to impact water resources, primarily through construction activities which move, remove, or otherwise handle vegetative cover and soils. Changes in vegetative cover and soils can change runoff and water flow patterns such that surface waters, groundwater, and wetlands are adversely impacted. Because water resources along the proposed route can be spanned and because construction best management practices can mitigate impacts to water resources, impacts to water resources from the project are anticipated to be minimal.

Surface Waters

The project is located in the Crow Wing River watershed of the Upper Mississippi River basin.²⁷² There are a number of lakes in the project area, including Hinds Lake, Upper Twin Lake, Lower Twin Lake, Blueberry Lake, Stocking Lake and Spirit Lake (**Appendix E**, Map E5).²⁷³ The project area also includes several rivers and streams, including the Shell River, Fishhook River, Straight River, Blueberry River, Cat River, Kettle Creek, and Kitten Creek.²⁷⁴ These lakes, rivers, and streams are classified by the Minnesota Department of Natural Resources (DNR) as public waters in Minnesota.²⁷⁵ 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.²⁷⁶ To work in public waters or to cross public waters requires a permit from the DNR (see Section 2.3).

Potential Impacts

Because the project avoids or spans surface waters in the project area, impacts to surface waters as a result of the 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 substation 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. The applicants' proposed route does not avoid all surface

²⁷¹ Id.

²⁷² CN and Route Permit Application, Section 9.6.2.

²⁷³ Id.

²⁷⁴ Id.

²⁷⁵ CN and Route Permit Application, Section 9.6.2; Definition of Public Waters, Minnesota Department of Natural Resources, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/pw_definition.html.

²⁷⁶ Public Waters Work Permit Program, Minnesota Department of Natural Resources, http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/index.html.

waters in the project area; however, the applicants indicate that all surface waters that are crossed will be spanned.²⁷⁷

Potential impacts to surface waters can also be mitigated by using best management practices for construction of the project. The applicants indicate that they will use best management practices to prevent construction sediments from impacting surface waters.²⁷⁸ Applicants also note that they will follow any DNR recommendations to minimize impacts at crossings of public waters.²⁷⁹ 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.

Floodplains

Sections of the applicants' proposed route across rivers and streams in the project area are within the 100-year floodplain, as this floodplain is identified by the Federal Emergency Management Agency (FEMA) (**Appendix E**, Map E6).²⁸⁰ Federal and state laws require that local governments take the 100-year floodplain into consideration when planning development.²⁸¹

Potential Impacts

Impacts to the 100-year floodplain and related development in the project area due to the project are anticipated to be minimal. Because of the relatively small cross section of proposed transmission line structures and their spacing, impacts to floodplains, if any, would be incremental and are anticipated to be *de minimis*.²⁸²

Mitigation

No impacts to the 100-year floodplain and related development in the project area are anticipated as a result of the project; thus, no mitigation measures are proposed.

Groundwater

The project is located in Minnesota's central groundwater province, which is characterized by thick sand and clay glacial drift over Precambrian and Cretaceous bedrock.²⁸³ This province has relatively good availability of groundwater.²⁸⁴ Groundwater in the province is closely linked with lakes, streams, and wetlands.²⁸⁵

²⁷⁷ CN and Route Permit Application, Section 9.6.2.

²⁷⁸ Id.

²⁷⁹ Id.

²⁸⁰ Id.

²⁸¹ Minnesota Rules 6120 ("Shoreland and Floodplain Management"), <https://www.revisor.mn.gov/rules/?id=6120>.

²⁸² CN and Route Permit Application, Section 9.6.2.

²⁸³ Ground Water Provinces, <http://www.dnr.state.mn.us/groundwater/provinces/index.html>.

²⁸⁴ Id.

²⁸⁵ Where is Groundwater and is it Available for Use?, http://files.dnr.state.mn.us/waters/groundwater_section/sustainability/whereisGW.pdf.

Potential Impacts

Impacts to groundwater due to the project are anticipated to be minimal. Potential impacts to groundwater from the project could occur (1) through surface water impacts and (2) impacts directly to groundwater resulting 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. The applicants indicate that, for most structures, concrete foundations will not be used (see Section 3.6). However, depending on the final alignment and design for the project, concrete foundations maybe be used for select structures. 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.

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.

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.²⁸⁶ They are typically seasonal in their extent. Wetlands in Minnesota are protected federally under Section 404 of the Clean Water Act and by the State of Minnesota under the Wetland Conservation Act.

Wetlands are present throughout the project area (**Appendix E**, Map E5). There are approximately 22 acres of wetlands within the applicants' proposed ROW for the project (**Table 15**). This includes 5.6 acres of forested wetlands.

Potential Impacts

Because most wetlands within the applicants' proposed route can be avoided or spanned, impacts to wetlands due to the project are anticipated to be minimal. Crossing a wetland does not necessarily mean that the wetland will be impacted, e.g., 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.

²⁸⁶ Types of Wetlands, <http://www.dnr.state.mn.us/wetlands/types.html>.

Table 15. Wetlands within Applicants’ Proposed Right-of-Way²⁸⁷

Route Segment	Forested Wetland Acres within ROW (100 ft.)	Total Wetland Acres within ROW (100 ft.)
Hubbard Substation to Straight River Substation	0.61	8.95
Straight River Substation to Blueberry Substation	2.98	9.24
Blueberry Substation to Red Eye Substation	2.04	4.03
Totals:	5.63	22.22

Forested wetlands within the transmission line ROW would likely undergo a permanent change of vegetation type as a result of the project. Transmission lines cannot be safely or reliably operated with trees growing up and into them (see Section 3.6). Therefore, existing trees must be removed throughout the ROW, including forested wetlands.²⁸⁸ The U.S. Army Corps of Engineers (USACE) may require wetland mitigation for the conversion of forested wetlands to non-forested wetlands.²⁸⁹

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.²⁹⁰

The applicants anticipate that a regional general permit from the USACE, under Section 404 of the Clean Water Act, will be required for the project.²⁹¹ The applicants indicate they will restore all wetlands in accordance with USACE requirements and with the requirements of Minnesota’s Wetland Conservation Act (see Section 2.3).²⁹² Commission route permits require permittees to avoid and minimize wetland impacts (**Appendices B and C**).

5.9 Soils

Transmission lines have the potential to impact soils directly by moving them, or indirectly by removing vegetative cover such that they are more susceptible to movement by wind and/or water. Impacts to soils due to the project are anticipated to be minimal and temporary.

Soils in the project area have been formed by glaciation and alluvial deposits.²⁹³ The depth of glacial

²⁸⁷ Additional Project Information from Applicants; CN and Route Permit Application, Section 9.6.2.

²⁸⁸ CN and Route Permit Application, Section 9.6.2.

²⁸⁹ Id.

²⁹⁰ Id.

²⁹¹ Id.

²⁹² Id.

²⁹³ CN and Route Permit Application, Section 9.8.

drift over bedrock varies from 200 to 600 feet.²⁹⁴ Soils in the area are generally very deep and range from poorly to well drained.²⁹⁵

Potential Impacts

Impacts to soils as a result of the project are anticipated to be minimal and temporary. Construction activities will move and handle soils to place transmission line poles. 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. Soils could also be compacted by machinery used to construct the project.

Mitigation

Potential impacts to soils can be mitigated by using best management practices for construction of the project. The applicants indicate that they will use variety of methods to minimize soil erosion, including the prompt revegetation of disturbed soils.²⁹⁶ Common mitigation measure employed to minimize soil erosion include:

- 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**).

5.10 Flora

Transmission lines have the potential to impact flora through the removal or disturbance of vegetation during construction. Additionally, flora may be impacted by the possible introduction of invasive species, or by changes in habitat (e.g., soils, water flows) that adversely impact plant growth. Potential impacts to flora due to the project are anticipated to be minimal to moderate.

The project area lies within the Northern Minnesota Drift and Lake Plains Section of the Laurentian Mixed Forest Province in northern Minnesota.²⁹⁷ This section is characterized by deep glacial deposits in outwash plains, moraines, and drumlin fields. Vegetation in the project area reflects the complex and patchy distribution of these glacial deposits.²⁹⁸ Forests of jack pine, basswood, paper birch, aspen, and

²⁹⁴ Id.

²⁹⁵ Id.

²⁹⁶ Id.

²⁹⁷ Laurentian Mixed Forest Province, <http://dnr.state.mn.us/ecs/212/index.html>. See also CN and Route Permit Application, Section 9.1.

²⁹⁸ Id.

northern red oak are common. Black spruce, tamarack, white cedar, and black ash are prominent on poorly drained soils.²⁹⁹

Well drained, upland soils in the project area have been cleared and converted to agricultural use (see Section 5.6). Fields are commonly bordered by forested areas. Native vegetation communities include forested and riparian areas. Wetlands are found throughout the project area and include meadows, marshes, shrub swamps, and thickets (see Section 5.8). Meadows are characterized by grasses as well as a variety of sedges and rushes.³⁰⁰ Marshes are typically dominated by cattails, bulrushes, and sedges.³⁰¹ Shrub swamps include willows, ferns, forbs, and grasses.³⁰² Thickets include alders, elderberry, cranberry, ferns, sedges, and grasses.³⁰³

Potential Impacts

Impacts to flora due to the project are anticipated to be minimal to moderate. Impacts to forested areas are anticipated as a result of construction of the project and maintenance of the transmission line ROW. The project is anticipated to impact approximately 60 acres of forested land (see Section 5.6). Impacts to other vegetation communities, for example agricultural fields and non-forested wetlands, are anticipated to be minimal as vegetation within these communities does not need to be cleared for ROW purposes and can, in many instances, be spanned. The project also may impact native vegetation by introducing invasive species, which may propagate in and along the transmission line ROW.

Mitigation

The primary means of mitigating impacts to flora is to avoid flora, particularly trees, through prudent routing. Mitigation can be achieved, in part, by utilizing existing infrastructure rights-of-way (e.g., roadway, transmission line) such that tree removal is minimized. Mitigation can also be accomplished by spanning plant communities.

Impacts to flora can also be mitigated by a number of other strategies, including: (1) placement of the alignment and of specific structures to avoid trees and other tall-growing species, (2) constructing during fall and winter months to limit plant damage, (3) leaving or replanting compatible plants at the edge of the transmission line ROW, (4) replanting on the transmission line ROW with low growing, native species, and (5) avoiding the introduction of invasive species – on equipment or through seeds or mulches. The applicants indicate that they will minimize the introduction and spread of invasive species by:³⁰⁴

- 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,

²⁹⁹ Pine Moraines & Outwash Plains Subsection, <http://www.dnr.state.mn.us/ecs/212Nc/index.html>.

³⁰⁰ Wetland and Plant Communities of Minnesota and Wisconsin, 3rd Edition, Minnesota Board of Water & Soil Resources, http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/.

³⁰¹ Id.

³⁰² Id.

³⁰³ Id.

³⁰⁴ CN and Route Permit Application, Section 9.6.4.

- Cleaning and inspection construction vehicles to remove dirt, mud, plant, and debris from vehicles prior to arriving at and leaving from construction sites.

Finally, impacts to flora 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**).

5.11 Fauna

Transmission lines have the potential to impact fauna through a variety of means including temporary displacement, habitat loss, and, for avian species, collision with transmission line conductors. Potential impacts to fauna due to the project are anticipated to be minimal.

The project area includes a variety of habitats including forested areas, grassland, agricultural fields, wetlands, and lakes and streams (**Appendix E**, Map E1). These habitats support a range of wildlife, including deer, bear, fox, skunks, raccoons, waterfowl, raptors, and songbirds.³⁰⁵ Reptiles in the project area include a variety of turtles and snakes; amphibians include frogs and toads. Fish species in area lakes include crappie, bluegill, northern pike, smallmouth bass, and walleye.³⁰⁶

There are four wildlife management areas (WMAs) in the project area where habitat is managed to support wildlife: Lowe WMA, Red Eye WMA, Kitten Creek WMA, and Wood Eye WMA (**Appendix E**, Map E3)

Potential Impacts

Impacts to fauna as a result of the project are anticipated to be minimal. In general, fauna 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. The project will remove approximately 60 acres of forested habitat. 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.³⁰⁷ 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 in the northern portion of the project area, 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

³⁰⁵ CN and Route Permit Application, Section 9.6.3.

³⁰⁶ LakeFinder, Minnesota Department of Natural Resources, <http://www.dnr.state.mn.us/lakefind/index.html>.

³⁰⁷ CN and Route Permit Application, Section 9.6.3.

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.

Mitigation

Potential impacts to fauna due to the 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 fauna 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. The applicants indicate that they will work with the DNR and USFWS to identify areas of the project where bird flight diverters are needed.³⁰⁸ The USFWS has indicated a need for bird flight diverters near the Red Eye WMA.³⁰⁹

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**). The USFWS has indicated that raptor perch deterrents (to avoid possible raptor electrocution) would be appropriate for transmission line structures near the Red Eye WMA.³¹⁰

5.12 Rare and Unique Natural Resources

Impacts to rare and unique natural resources (flora and fauna) from the project could result from ecosystem changes, introduction of invasive species, habitat loss, and, for avian species, collision with transmission line conductors. Potential impacts to rare and unique natural resources due to the project are anticipated to be minimal; however, mitigation measures are recommended by DNR and USFWS.

Flora

A review of natural resource databases indicates that there are rare and unique plant communities in the project area (**Appendix E**, Map E7).³¹¹ The Minnesota biological survey has identified an area of moderate biological significance in Section 30 of Hubbard Township and in Sections 25, 26, and 35 of Straight River Township in Hubbard County (**Appendix E**, Map E7).³¹² This area contains several occurrences of Jack Pine – Bush Honeysuckle woodland, a rare native plant community. The area also includes old growth forest remnants north and south of the existing 34.5 kV line in Section 30 of Hubbard Township.³¹³ Old growth forests are natural forests that have developed over a long period of time without experiencing severe, stand-replacing disturbances such as fires, windstorm, or logging. There are also sites of moderate biological significance in Runeberg Township, Becker County, just west of the applicants' proposed route (**Appendix E**, Map E7).

³⁰⁸ Id.

³⁰⁹ Id.

³¹⁰ Id.

³¹¹ CN and Route Permit Application, Section 9.7.

³¹² Id.

³¹³ Id.

In addition to these rare plant communities, there exist in the project area rare and unique plant species – Yellow Rail, Ram’s-head Lady’s-slipper, and Dragon’s Mouth (**Table 16**).³¹⁴ Yellow Rail and Dragon’s mouth are found in wetland areas; Ram’s-head Lady’s-slipper is found in coniferous forest habitats.³¹⁵

Fauna

A review of natural resource databases indicates that there are three rare and unique animal species in the project area – the Greater Prairie Chicken, Eastern Hog-Nosed Snake, and Creek Heelsplitter (a freshwater mussel) – and habitat for a possible fourth species, the Northern Long-Eared Bat (**Table 16**).³¹⁶ The Greater Prairie Chicken and Eastern Hog-Nosed Snake are found generally in open prairie and grassland habitats.³¹⁷ The Creek Heelsplitter is found in freshwater creeks and streams.³¹⁸ The Northern Long-Eared Bat is found throughout eastern and central North America.³¹⁹ The bats hibernate in caves and mines during winter months and roost in forested areas during summer months.³²⁰

The Northern Long-Eared Bat (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.³²¹ 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.³²² One such cause is the loss or degradation of summer roosting habitat. Though there are no known occurrences of NLEB roosting in the project area,³²³ the area includes trees that may serve as roosting habitat for NLEB.

Potential Impacts

Impacts to rare and unique species due to the project are anticipated to be minimal. In general, the applicants’ proposed route is away from rare communities and rare species in the project area. Where the applicants’ proposed route crosses and/or is near such communities, it does so following existing rights-of-way. The segment of the applicants’ proposed route from the Hubbard substation to the Straight River substation passes through an area of biological significance and old growth forest remnants (**Appendix E**, Map E7). However, in this segment, the new 115 kV line will utilize the ROW for the existing 34.5 kV; the new 115 kV line will replace the 34.5 kV line. Thus, impacts in this area will be limited to the already disturbed 34.5 kV ROW and new impacts to rare resources in this segment are anticipated to be minimal.

³¹⁴ Id.

³¹⁵ Id.

³¹⁶ Id.

³¹⁷ Id.

³¹⁸ Id.

³¹⁹ USFWS Endangered Species, Northern Long-Eared Bat, <http://www.fws.gov/midwest/endangered/mammals/nlba/>.

³²⁰ Id.

³²¹ Id.

³²² Id.

³²³ CN and Route Permit Application, Section 9.6.3.

Table 16. Rare and Unique Species in Project Area³²⁴

Type	Common Name	Scientific Name	Number of Recorded Occurrences in Project Area	Federal Status	State Status
Plant	Yellow Rail	<i>Coturnicops noveboracensis</i>	2	None	Special Concern
Plant	Ram's-head Lady's-slipper	<i>Cypripedium arietinum</i>	1	None	Threatened
Plant	Dragon's Mouth	<i>Arethusa bulbosa</i>	1	None	None; Possible Future Listing
Bird	Greater Prairie Chicken	<i>Tympanuchus cupido</i>	2	None	Special Concern
Reptile	Eastern Hog-Nosed Snake	<i>Heterodon masicus</i>	1	None	Watch List
Mussel	Creek Heelsplitter	<i>Lasmigona compressa</i>	3	None	Special Concern
Bat	Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	---	Threatened	None

Though portions of the area of biological significance in Runeberg Township, Becker County, are within the applicants' proposed route, the applicants' proposed alignment in this area is on the east side of the county line road, and outside of the area of biological significance (**Appendix E**, Map E7). Thus, impacts to this area are not anticipated.

The new 115 kV line 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 could adversely affect water quality and thus the Creek Heelsplitter mussel.

Finally, though there are no known occurrences of NLEB roosting in the project area, it is possible that NLEB use trees in the area for roosting. The applicant's proposed route will impact approximately 60 acres of forested land. The removal of these trees could limit and degrade roosting habitat for the NLEB.

Mitigation

The primary 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. Impacts can be mitigated by spanning rare resources. Impacts can also be mitigated by using existing, already disturbed, infrastructure rights-of-way.

³²⁴ CN and Route Permit Application, Section 9.7, Table 9-11; USFWS Endangered Species, Northern Long-Eared Bat, <http://www.fws.gov/midwest/endangered/mammals/nlba/>.

The applicants indicate that they will use several strategies to minimize impacts to rare natural resources, including:³²⁵

- Minimizing tree and shrub removal,
- Utilizing best management practices to prevent soil erosion,
- Revegetating disturbed areas with native species and wildlife conservation species.

For that segment of the applicants' proposed route from the Hubbard substation to the Straight River substation, which contains an area of biological significance and old growth forest remnants, the DNR has recommended several mitigation strategies, including:³²⁶

- 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,
- Using effective erosion control measures,
- Revegetating with native species and weed-free seed mixes.

To prevent deterioration of water quality and adverse impacts on the Creek Heelsplitter mussel, the DNR has also recommended that erosion control measures be implemented near Kettle Creek and the Blueberry River.³²⁷

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. The USFWS indicates that an incidental take permit may be necessary for projects that result in greater than one acre of tree removal.³²⁸ The take permit may impose conditions to mitigate potential impacts to NLEB.

5.13 Application of Routing Factors to the Proposed Project

The Power Plant Siting Act requires the Commission to locate transmission lines in a manner that is “compatible with environmental preservation and the efficient use of resources” and that minimizes “adverse human and environmental impact[s]” while ensuring electric power reliability.³²⁹ Minnesota

³²⁵ CN and Route Permit Application, Section 9.7.

³²⁶ Id.

³²⁷ Id.

³²⁸ USFWS Endangered Species, Northern Long-Eared Bat,

<http://www.fws.gov/midwest/endangered/mammals/nlba/>.

³²⁹ Minnesota Statute 216E.02, <https://www.revisor.mn.gov/statutes/?id=216E.02>.

Statute Section 216E.03, subdivision 7(b) identifies considerations that the Commission must take into account when designating transmission lines routes.³³⁰

Minnesota Rule 7850.4100 lists 14 factors for the Commission to consider in its route permitting decisions, including effects on human settlements, effects on public health and safety, and effects on the natural environment (**Figure 14**).³³¹ In this section, the information gathered by EERA staff during the environmental review process, as presented in this EA, is applied to these factors.

The discussion here focuses first of the first 12 routing factors of Minnesota Rule 7850.4100 (factors A through L). Routing factors M and N – the unavoidable and irreversible impacts of the project – are discussed at the end of this section.

Routing factor I, the use of large electric generating plant sites, is not relevant to this project and is not discussed here. Routing factor L, the costs of the project which are dependent on design and route, is also not discussed here. This factor is relevant when there is more than one design and/or route with costs that can be compared. The only route discussed here is the applicant’s proposed route. Routing factor L is relevant to possible alternative sites and routes for the project – the relative merits of these alternatives are discussed in Section 6.0.

Routing Factors and Elements

Some of the routing factors in Minnesota Rule 7850.4100 describe a resource in relatively succinct terms, e.g., effects on archaeological and historic resources. Other routing factors are more descriptive and include a list of factor elements, i.e., parts that make up the sum of the whole factor. For example, the factor “effects on human settlements” includes the factor elements displacement, noise, aesthetics, cultural values, recreation, and public services. Finally, there are routing factors that are relatively succinct, but for which elements have been identified through the scoping process and analyzed in this EA. For example, the factor “public health and safety” includes the elements electric and magnetic fields, implantable medical devices, stray voltage, induced voltage, and air quality.

³³⁰ Minnesota Statute 216E.03, Subd. 7, <https://www.revisor.mn.gov/statutes/?id=216E.03>.

³³¹ Minnesota Rule 7850.4100, <https://www.revisor.mn.gov/rules/?id=7850.4100>.

Figure 14. Factors Considered by the Commission for Transmission Line Route Permits

In determining whether to issue a route permit for a high voltage transmission line, the Commission shall consider the following factors of Minnesota Rule 7850.4100:

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

Routing Factors for Which Impacts are Anticipated to be Minimal

There are several routing factors, and factor elements, for which impacts are anticipated to be minimal with the general conditions in section 5.0 of the Commission’s generic route permit template. These are:

- Effects on human settlements (factor A) for the factor elements – aesthetics, noise, displacement, property values, economics, cultural values, electronic interference, and public services;

- Effects on public health and safety (factor B), including the factor elements – electric and magnetic fields, implantable medical devices, stray voltage, inducted voltage, and air quality;
- Effects on land-based economies (factor C) for the factor elements – agriculture, mining, and recreation and tourism;
- Effects on the natural environment (factor E), for the factor elements air and water quality.

Impacts to non-tree flora are anticipated to be minimal (see Section 5.10). However, potential impacts to trees are anticipated to be moderate. Because logging occurs throughout the project area and because many residents log for personal use, potential impacts to trees are discussed under land-based economies (factor C) and natural environment (factor E) (see below).

Routing Factors for Which Impacts are Anticipated to be Minimal to Moderate, and Which May Require Special Conditions to Mitigate

There are several routing factors, and factor elements, for which impacts are anticipated to be minimal to moderate with the general conditions in section 5.0 of the Commission’s generic route permit template. These impacts may require special conditions in a route permit in order for the impacts to be mitigated. The factors and elements are:

- Effects on human settlements (factor A) for the factor element zoning and land use compatibility;
- Effects on archaeological and historic resources (Factor D);
- Effects on land-based economies (factor C) for the factor element forestry;
- Effects on the natural environment (factor E) for the factor elements flora and fauna;
- Effects on rare and unique resources (factor F);

Human Settlements – Zoning and Land Use Compatibility

The project is generally compatible with land uses in the project area. However, the applicants’ proposed route could adversely impact the Alajoki Cemetery (see Section 5.3). Transmission line structures, were they placed along the front edge of the cemetery or its future expansion, would impact the aesthetics of the cemetery, its approachability for visitors, and, to some extent, access to the cemetery. Impacts to the Alajoki Cemetery could be mitigated by placing transmission line structures on either side of the cemetery, i.e., by not placing a structure along the front edge of the existing cemetery or its future expansion.

Archaeological and Historic Resources

Impacts to known archaeological and historic resources are anticipated to be minimal as a result of the project (see Section 5.7). However, because there is a moderate to high potential that the proposed route will impact unrecorded archaeological sites, SHPO recommends that a Phase I archaeological survey be conducted for the project.

Land-Based Economies – Forestry

Impacts to local forestry are anticipated to be moderate as a result of the project (see Section 5.6). The project will impact approximately 60 acres of forested land. Impacts of the project are avoided and

mitigated by the proposed route's use of existing roadway and transmission line ROW. Impacts to trees can be further mitigated by prudent placement of the transmission line alignment and of specific structures to avoid forested areas. However, because of the prevalence of trees in the project area, impacts cannot be completely avoided or mitigated.

Natural Environment – Flora

Impacts to flora are anticipated to be minimal with the exception of impacts to trees (see Section 5.10). Impacts to trees are anticipated to be moderate. The project will impact approximately 60 acres of trees. Impacts to flora can be mitigated by prudent placement of the transmission line alignment and specific structures to avoid flora, particularly trees.

Natural Environment – Fauna

Impacts to fauna are anticipated to be minimal as a result of the project. However, avian species could be impacted by the project through collision with transmission line conductors. Because of the relatively good habitat for avian species in the project area, particularly for waterfowl in the northern half of the project area, impacts to avian species could range from minimal to moderate. Impacts to avian species can be mitigated by the use of bird flight diverters. The USFWS has indicated a need for bird flight diverters near the Red Eye WMA. There may be other areas of the project where the DNR and USFWS would recommend the use of bird flight diverters.

Avian species with relatively larger wing spans may also be impacted by electrocution. Impacts to avian species caused by electrocution can be mitigated by the use of best practices for conductor spacing and shielding. The USFWS has indicated that raptor perch deterrents (to avoid possible raptor electrocution) would be appropriate for transmission line structures near the Red Eye WMA.

Rare and Unique Resources

Impacts to rare and unique resources due to the project are anticipated to be minimal. However there are resources that could be impacted by the project and for which mitigation measures have been recommended by DNR and USFWS.

For that segment of the applicants' proposed route from the Hubbard substation to the Straight River substation, which contains an area of biological significance and old growth forest remnants, the DNR has recommended several mitigation strategies, including:

- 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,
- Using effective erosion control measures,
- Revegetating with native species and weed-free seed mixes.

To prevent deterioration of water quality and adverse impacts on the Creek Heelsplitter mussel, the DNR has also recommended that erosion control measures be implemented near Kettle Creek and the Blueberry River.

The USFWS recommends minimizing the removal of trees that could be used as roosting habitat for the Northern Long-Eared Bat (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. The USFWS indicates that an incidental take permit may be necessary for projects that result in greater than one acre of tree removal. The take permit may impose conditions to mitigate potential impacts to NLEB.

Routing Factors that are Well Met

There are several routing factors that do not describe a resource or impact but rather indicate the state's interest in efficient design and use of resources, particularly the state's limited land resources. For the applicants' proposed project, these factors are well met:

- Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity (factor G);
- Use or paralleling of existing right-of-way, survey lines, natural division lines, and agricultural field boundaries (factor H);
- Use of existing transportation, pipeline, and electrical transmission systems or rights-of-way (factor J);
- Electrical system reliability (factor K).

The project is designed to improve electrical service and reliability in the project area (see Section 4.1). The project is also designed to accommodate future expansion of the transmission system in the area (see Section 3.1) The applicants' proposed route utilizes existing transmission and roadway ROW for approximately 99 percent of its length (see Section 5.3).

Unavoidable Impacts

Transmission lines are large infrastructure projects that have adverse human and environmental impacts. The character of these impacts and the ways in which they can be mitigated are discussed in this EA in Sections 5 and 6. Even with mitigation strategies, there are adverse impacts of the project which cannot be avoided. These impacts are anticipated to occur for all routes and route and site alternatives and to vary, if at all, as discussed in Section 6.

Aesthetic impacts cannot be avoided. The project would introduce new 115 kV transmission line structures and conductors. These structures and conductors would be visible; therefore, they would have an adverse aesthetic impact. Removal of trees and other vegetation to construct the project would also create aesthetic impacts. Temporary construction-related impacts cannot be avoided. These include construction-related noise and dust generation, and disruption of traffic near construction sites.

Impacts to agriculture and forestry cannot be avoided. The project requires the construction of transmission line structures and substations in a project area that includes agricultural fields and

forested areas. Agricultural soils will, to some extent, be compacted; structures may impede agricultural practices. Trees within the transmission line ROW would be removed.

Finally, impacts to the natural environment cannot be avoided. Even if impacts can be limited to the ROW for the project, construction and operation of the transmission line would require tree removal and brush trimming, as well as clearing at structure and substation sites. These are unavoidable impacts to vegetation. Unavoidable impacts to wildlife include the removal or fragmentation of habitat. Transmission line conductors adversely affect avian species by creating a risk of collision. These collisions would occur despite mitigation strategies such as the use of bird flight diverters.

Irreversible and Irretrievable Commitments of Resources

The commitment of a resource is irreversible when it is impossible or very difficult to redirect that resource to a different future use. An irretrievable commitment refers to the use or consumption of a resource such that it is not recoverable for later use by future generations. These types of commitments are anticipated to occur for all routes and route and site alternatives and not to vary significantly between routing options.

The commitment of land for a transmission line ROW is likely an irreversible commitment. In general, lands in the ROWs for large infrastructure projects such as railroads, highways and transmission lines remain committed to these projects for a relatively long period. Even in instances where a ROW is abandoned, the land within the ROW is typically repurposed for a different infrastructure use, such as a rails-to-trails program, and is not returned to a previous land use. For transmission lines, however, abandoned ROWs can be returned to an existing or previous use (e.g., row crop, pasture) in certain circumstances.

There are few commitments of resources associated with the project that are irretrievable. These commitments include the steel, concrete and hydrocarbon resources committed to the project, though it is possible that the steel could be recycled at some point in the future. Labor and fiscal resources required for the project are also irretrievable commitments.

6.0 Potential Impacts of Route and Site Alternatives

This section discusses the potential impacts and mitigation measures associated with route and site alternatives identified in the scoping decision (**Appendix A**). These alternatives may provide a means to avoid or mitigate potential impacts of the project.

Resources and potential impacts are discussed here in the order that they are discussed in Section 5. Some impacts are relatively independent of the route or site selected for the project. For these impacts, the reader is referred to the discussion in Section 5. However, for some resources, impacts vary among alternatives and/or between the alternative and the proposed project. These impacts are discussed here.

Summary of Potential Impacts of Route and Site Alternatives

In general, impacts of the route and site alternatives are similar to those of the proposed project and to each other. In some instances, the alternatives offer a means to avoid or mitigate potential impacts. In doing so, the alternatives offer tradeoffs.

West of the city of Menahga, the Blueberry route alternative minimizes aesthetic impacts of the project by placing it away from residences; however, it utilizes less existing ROW and impacts more acres of trees and forested wetlands than the proposed route. These impacts to trees could impact roosting habitat for the Northern Long-Eared Bat (NLEB).

The impacts of the western Blueberry substation site alternative are the same as the proposed Blueberry substation site except for cost. The western Blueberry substation site is more expensive than the proposed substation site.

In the southern project area, the Pipeline South and East of 109th Ave. route alternatives are near the fewest residences and thus minimize aesthetic impacts. The proposed route and the 119th Ave. and U.S. Route 71 route alternatives best place like infrastructure with like, and thus also minimize aesthetic impacts. Impacts to forested acres are similar across routing options – the East of 109th Ave. route alternative impacts relatively more forested acres; the proposed route impacts the fewest number of forested acres. Costs are similar across routing options. The Pipeline South route alternative is relatively more expensive than other routing options.

6.1 Blueberry Route Alternative

There is one route alternative and one substation site alternative in Blueberry Township, Wadena County, near the city of Menahga (**Figure 5**). The Blueberry route alternative proceeds from the applicants' proposed route at Highway 87, south along the county line (Wadena Line Rd.) approximately 0.7 miles and then eastward across Section 30 of Blueberry Township and enters the Blueberry substation from the west.

The Blueberry route alternative could be used for the project instead of the applicants' proposed route. The discussion here compares the Blueberry route alternative to the comparable segment of the applicants' proposed route – that segment from the intersection of the proposed route and Highway 87 to the proposed Blueberry substation.

Human Settlements

Impacts to human settlements are impacts related to: aesthetics, noise, displacement, property values, economics, cultural values, electronic interference, and zoning and land use compatibility (see Section 5.3). Impacts to human settlements along the Blueberry route alternative are anticipated to be similar to those along the proposed route – they are anticipated to be minimal.

Though impacts are anticipated to be minimal, the one element of human settlements where impacts are anticipated to vary between the Blueberry route alternative and the proposed route is aesthetics. As discussed in Section 5.3, the primary strategy for minimizing aesthetic impacts is prudent routing, i.e., choosing routes and alignments that are most harmonious with the landscape. Aesthetic impacts of the project can be minimized by placing the project away from residences. The Blueberry route alternative is near fewer residences than the proposed route (**Table 17**).

Table 17. Distance of Residences from Anticipated Alignment – Blueberry Route Alternative and Proposed Route³³²

Route	0 to 50 feet	51 to 100 feet	101 to 150 feet	151 to 200 feet	201 to 250 feet	Total
Blueberry Route Alternative	0	1	1	0	0	2
Proposed Route	0	0	0	5	1	6

Aesthetic impacts can also be mitigated by placing like with like – i.e., by placing new transmission infrastructure where there is already existing linear infrastructure. The proposed route utilizes existing ROW for 81 percent of its length; the Blueberry route alternative utilizes existing ROW for 37 percent of its length (**Table 18**). The proposed route follows Highway 87 and 111th Ave. The Blueberry route alternative follows Wadena Line Rd. south before turning eastward to the Blueberry substation. This eastward leg is cross county and does not follow existing ROW or field lines.

Table 18. Use of Existing ROW – Blueberry Route Alternative and Proposed Route³³³

Route	Total Length (miles)	Length Following Roadway, Pipeline, or Transmission Line ROW (miles percent)	Length Following Field Boundaries (miles percent)
Blueberry Route Alternative	2.07	0.77 37%	0 0%
Proposed Route	1.95	1.58 81%	0 0%

³³² Additional Project Information from Applicants.

³³³ Id.

Thus, the Blueberry route alternative minimizes aesthetic impacts because it is near relatively fewer residences. However, the proposed route minimizes aesthetic impacts by making relatively greater use of existing ROW.

Public Health and Safety

Impacts to public health and safety along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.4).

Public Services

Impacts to public services along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.5).

Land-Based Economies

Impacts to land-based economies are impacts to agriculture, forestry, mining and recreation and tourism (see Section 5.6). Impacts to mining and recreation and tourism along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal. The Blueberry route alternative does place the route away from gravel pits near Highway 87. However, impacts to these gravel pits are not anticipated with the proposed route because the new 115 kV line can be placed between the pits and the roadway without impacting current or future gravel mining activities.

Impacts to agriculture and forestry are anticipated to vary between the Blueberry route alternative and the proposed route. The Blueberry route alternative impacts relatively fewer agricultural acres and relatively more forested acres than the proposed route (**Table 19**). However, as discussed in Section 5.6, permanent impacts to agricultural operations are generally limited to pole locations. Thus, the difference in impacts to agricultural operations between the Blueberry route alternative and the proposed route is anticipated to be minimal.

In contrast, permanent impacts to forested acres are not limited to pole locations – they extend throughout the transmission line ROW. Thus, impacts to forestry along the Blueberry route alternative are significantly greater than along the proposed route.

Table 19. Agricultural and Forested Acres Within ROW – Blueberry Route Alternative and Proposed Route³³⁴

Route	Agricultural Acres Within ROW (100 ft.)	Forested Acres Within ROW (100 ft.)
Blueberry Route Alternative	1.39	18.38
Proposed Route	17.45	4.03

³³⁴ Id.

Archaeological and Historic Resources

Impacts to archaeological and historic resources along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.7).

Water Resources

Impacts to water resources are impacts to surface waters, floodplains, groundwater, and wetlands (see Section 5.8). With the exception of wetlands, impacts to water resources along the along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal.

Impacts to wetlands vary between the Blueberry route alternative and the proposed route. The Blueberry route alternative will impact more wetlands than proposed route (**Table 20**). Additionally, the Blueberry route alternative will impact more forested wetlands than the proposed route. This difference in wetland impacts is due primarily to the north-south leg of the Blueberry route alternative along the Wadena Line Rd., which proceeds through forested wetlands (**Appendix E, Map E5**).

Table 20. Wetlands Within ROW – Blueberry Route Alternative and Proposed Route³³⁵

Route	Forested Wetlands Acres Within ROW (100 ft.)	Total Wetland Acres Within ROW (100 ft.)
Blueberry Route Alternative	3.40	4.38
Proposed Route	1.95	3.14

Soils

Impacts to soils along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.9).

Flora

Impacts to non-tree flora along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.10). However, impacts to trees are anticipated to be greater along the Blueberry route alternative than the proposed route (**Table 19**).

Fauna

Impacts to fauna along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.11). Because of the relatively good habitat for avian species in the project area, impacts to avian species could range from minimal to moderate. However, these impacts can be mitigated through the use of bird flight diverters.

Rare and Unique Natural Resources

Impacts to rare and unique natural resources along the Blueberry route alternative are anticipated to be similar to those along the proposed route and minimal (see Section 5.12). The Blueberry route alternative is adjacent to an area of moderate biological significance (**Appendix E, Map E7**). This area is

³³⁵ Id.

west of Wadena Line Rd. Though the Blueberry route alternative follows Wadena Line Rd., the anticipated alignment is on the east side of the road. Thus, impacts to this area of biological significance are anticipated to be minimal.

The Blueberry route alternative will impact a greater number of trees than the proposed route (discussed above). Though there are no known occurrences of NLEB roosting in the project area, these trees may serve as roosting habitat for NLEB. The USFWS recommends minimizing the removal of trees that could be used as roosting habitat for the NLEB. The USFWS has indicated that an incidental take permit may be necessary for projects that result in greater than one acre of tree removal.

Costs which are Dependent on Design and Route

The cost of the Blueberry route alternative is slightly higher, but nearly the same as the cost of the proposed route (**Table 21**).

Table 21. Estimated Costs – Blueberry Route Alternative and Proposed Route³³⁶

Route	Estimated Cost (dollars)
Blueberry Route Alternative	1.25 million
Proposed Route	1.01 million

Relative Merits of Blueberry Route Alternative

This section utilizes the routing factors of Minnesota Rule 7850.4100 and factor elements to analyze the relative merits of the Blueberry route alternative and the comparable segment of the applicants’ proposed route (see **Figure 14**).

The discussion in this section (and in Sections 6.2 and 6.3) uses text and a graphic to describe the relative merits of specific routing options (**Figure 15**). For routing factors where impacts are anticipated to vary with routing options, the graphic represents these anticipated impacts and compares them across these options. For routing factors that express the State of Minnesota’s interest in the efficient use of resources (for example, the use of existing rights-of-way), the graphic represents the consistency of routing options with these interests and compares them one to the other.

The discussion here focuses first of the first 12 routing factors of Minnesota Rule 7850.4100 (factors A through L). Routing factors M and N – the unavoidable and irreversible impacts of the project – are discussed in Section 5.13.

Routing factor I, the use of large electric generating plant sites, is not relevant to this project and is not discussed here. For purposes of discussion here, and with respect to routing factor G, it is assumed all

³³⁶ Id. Includes estimates of wetland mitigation costs. Wetland mitigation costs are difficult to determine without final line design and because of unknown variables such as wetland impact ratios and wetland credit costs and availability.

routing and siting options are equal with regard to maximizing energy efficiencies and accommodating expansion of transmission capacity. With respect to environmental impacts, the examination of such impacts suggested by routing factor G is included in the discussion of other routing factors and elements that more specifically address an environmental impact (e.g., effects on the natural environment, routing factor E). Thus, factor G is not discussed further here.

Routing factors H and J address similar issues, the use or paralleling of existing ROWs. Routing factor H relates to the use or paralleling of existing ROWs, but also includes items that do not have a ROW – survey lines, natural division lines and agricultural field boundaries. Routing factor J relates to the use of existing transportation, pipeline and electrical transmission ROWs. For purposes here, these factors will be considered as one – the use or paralleling of existing ROWs, where there is infrastructure that has a ROW. However, the discussion will include, as appropriate, comment on the use of lines and boundaries by routing options.

Figure 15. Guide to Relative Merits of Routing / Siting Options

Anticipated Impact or Consistency with Routing Factor	Color / Shape
Impacts are anticipated to be minimal with the general conditions in section 5.0 of the Commission’s generic route permit template – OR – routing/siting option is very consistent with routing factor.	
Impacts are anticipated to be minimal to moderate with general conditions in section 5.0 of the Commission’s generic route permit template; impacts may require special conditions or selection of a specific routing option to mitigate – OR – routing/siting option is consistent with routing factor but less so than other options in this area.	
Impacts are anticipated to be moderate and unable to be mitigated – OR – routing/siting option is not consistent with routing factor or consistent only in part.	

Routing Factors for Which Impacts are Not Anticipated to Vary Between Routing Options

There are several routing factors, and factor elements, for which impacts are not anticipated to vary significantly between the Blueberry route alternative and the proposed route. These are:

- Effects on human settlements (factor A) for the factor elements – noise, displacement, property values, economics, cultural values, electronic interference, zoning and land use compatibility, and public services;
- Effects on public health and safety (factor B), including the factor elements – electric and magnetic fields, implantable medical devices, stray voltage, inducted voltage, and air quality;
- Effects on land-based economies (factor C) for the factor elements – agriculture, mining, and recreation and tourism;
- Effects on archaeological and historic resources (factor D);

- Effects on the natural environment (factor E), for the factor elements – fauna and water and air quality;
- Electrical systems reliability (factor K);
- Costs which are dependent on design and route (factor L).

Though there is a difference in wetland impacts between the routing options, this difference is not anticipated to result in significantly different water quality impacts (factor E). It will result in differential impacts to flora (discussed below).

Likewise, though there is a slight difference in costs between the routing options, this difference, in light of the uncertainty of wetland mitigation costs and preliminary design estimates, is not anticipated to be significant.

Routing Factors for Which Impacts are Anticipated to Vary Between Routing Options

There are several routing factors, and factor elements, for which impacts are anticipated to vary significantly between the Blueberry route alternative and the proposed route. These are:

- Effects on human settlements (factor A) for the factor element aesthetics;
- Effects on land-based economies (factor C) for the factor element forestry;
- Effects on the natural environments (factor E), for the factor element flora;
- Effects on rare and unique natural resources (factor F);
- Use of existing rights-of-way (factors H and J).

These factors and factor elements are summarized here and in **Figure 16**.

Human Settlements - Aesthetics

In the area of the Blueberry route alternative, the indicators of potential aesthetic impacts are mixed. The Blueberry route alternative is near fewer residences than the proposed route, and thus minimizes aesthetic impacts. The proposed route makes better use of existing ROW, and thus minimizes aesthetic impacts by placing like with like. On whole, because it is near fewer residences, it is likely that the Blueberry route alternative best minimizes aesthetic impacts of the project.

Land-Based Economies - Forestry

The Blueberry route alternative impacts more acres of forested land than the proposed route (18.38 acres versus 4.03 acres, **Table 19**).

Natural Environment – Flora

The Blueberry route alternative impacts more acres of trees than the proposed route. Additionally, the Blueberry route alternative impacts more acres of forested wetlands than the propose route. Thus, the Blueberry route alternative has a significantly greater impact on tree flora than the proposed route.

Rare and Unique Natural Resources

The Blueberry route alternative will impact more trees than the proposed route. Thus, it may have a greater impact on roosting habitat for the NLEB than the proposed route.

Use of Existing Rights-of-Way

The proposed route utilizes more existing ROW than the Blueberry alternative. The proposed route uses existing ROW for 81 percent of its length; the Blueberry route alternative utilizes existing ROW for 37 percent of its length.

Figure 16. Relative Merits of Blueberry Route Alternative and Proposed Route

Routing Factor / Element	Applicants' Proposed Route	Blueberry Route Alternative	Summary
Human Settlements / Aesthetics			The Blueberry route alternative is near fewer residences than the proposed route. The proposed route makes better use of existing ROW.
Land-Based Economies / Forestry			The Blueberry route alternative impacts more forested acres than the proposed route.
Natural Environment / Flora			The Blueberry route alternative impacts more acres of trees than the proposed route.
Rare and Unique Natural Resources			The Blueberry route alternative impacts more trees than the proposed route. This may result in a relatively greater impact on NLEB roosting habitat.
Use of Existing ROW			The proposed route utilizes more existing ROW than the Blueberry alternative

6.2 Western Blueberry Substation Site Alternative

The western Blueberry substation site alternative would place the Blueberry substation on the western edge of Section 30 of Blueberry Township, at the point where the Blueberry route alternative turns eastward (**Figure 5**). If the Blueberry substation were constructed at this alternative site, the existing 34.5 kV line would need to be extended westward to reach the substation.

This alternative substation site would only be used in conjunction with the Blueberry route alternative. Thus, the impacts of the alternative site, relative to the proposed Blueberry substation site, would include (1) the impacts of the Blueberry route alternative, and (2) those impacts that vary significantly from the impacts of the proposed Blueberry substation site. The impacts of the Blueberry route alternative are discussed above (see Section 6.1). Those impacts that vary between the alternative substation site and the proposed Blueberry substation site (and only the sites) are discussed here.

Human Settlements

Impacts to human settlements are impacts related to: aesthetics, noise, displacement, property values, economics, cultural values, electronic interference, and zoning and land use compatibility (see Section 5.3). Impacts to human settlements as a result of the western Blueberry substation site alternative are anticipated to be similar to those of the applicant's proposed Blueberry substation site – they are anticipated to be minimal.

Though impacts are anticipated to be minimal, the one element of human settlements where impacts are anticipated to vary between the western substation site and the proposed substation site is noise. The nearest residence to the western substation site is at a distance of 420 ft.³³⁷ The estimated noise level at this residence due to the substation is 33 dBA.³³⁸ This level is below Minnesota state noise standards, but it is slightly higher than the estimated noise level for the nearest residence to the proposed substation site. The nearest residence to the applicant's proposed substation site is at a distance of 1050 ft., and the estimated noise level at this residence is 25 dBA (see Section 5.3).

Public Health and Safety

Impacts to public health and safety due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.4).

Public Services

Impacts to public services due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.5).

Land-Based Economies

Impacts to land-based economies are impacts to agriculture, forestry, mining and recreation and tourism (see Section 5.6). Impacts to land-based economies due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and

³³⁷ Additional Project Information from Applicants.

³³⁸ Id.

minimal. Neither substation site impacts agricultural land.³³⁹ Both sites impact approximately 2.1 acres of forested land.³⁴⁰

Archaeological and Historic Resources

Impacts to archaeological and historic resources due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.7).

Water Resources

Impacts to water resources are impacts to surface waters, floodplains, groundwater, and wetlands (see Section 5.8). Impacts to water resources due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal. The western substation site does not impact wetlands; the proposed substation site would impact 0.27 acres of wetlands.³⁴¹

Soils

Impacts to soils due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.9).

Flora

Impacts to flora due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.10).

Fauna

Impacts to fauna due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.11).

Rare and Unique Natural Resources

Impacts to rare and unique natural resources due to the western Blueberry substation site alternative are anticipated to be similar to those of the proposed Blueberry substation site and minimal (see Section 5.12). The western substation site is near an area of moderate biological significance (**Appendix E**, Map E7). This area is west of Wadena Line Rd. The western substation site is on the east side of this road. Thus, impacts to this area of biological significance are anticipated to be minimal.

Costs which are Dependent on Design and Route

The cost of the western Blueberry substation site alternative is higher than the proposed Blueberry substation site (**Table 22**). The cost is higher due to the need to extend the existing 34.5 kV line and existing distribution lines that will connect at the substation westward approximately one mile to reach the western Blueberry substation site.³⁴²

³³⁹ Id.

³⁴⁰ Id.

³⁴¹ Id.

³⁴² Id.

Table 22. Estimated Costs – Western Blueberry Substation Site Alternative and Proposed Blueberry Substation Site³⁴³

Substation	Estimated Cost (dollars)
Western Blueberry Substation Site Alternative	3.43 million
Proposed Blueberry Substation Site	3.00 million

Relative Merits of Western Blueberry Substation Site Alternative

This section utilizes the routing factors of Minnesota Rule 7850.4100 and factor elements to analyze the relative merits of the western Blueberry substation site alternative and the applicants’ proposed Blueberry substation site. This section uses the same graphic representation and mode of discussion as Section 6.1.

The use of existing rights-of-way (factors H and J) is not relevant to the location of the substation site and is not discussed further here. These factors are relevant to the selection of a routing option which could utilize the western Blueberry substation site (see Section 6.1).

Routing Factors for Which Impacts are Not Anticipated to Vary Between Routing Options

There are several routing factors, and factor elements, for which impacts are not anticipated to vary significantly between the western Blueberry substation site alternative and the proposed Blueberry substation site. These are:

- Effects on human settlements (factor A) , including the factor elements – aesthetics, noise, displacement, property values, economics, cultural values, electronic interference, zoning and land use compatibility, and public services;
- Effects on public health and safety (factor B), including the factor elements – electric and magnetic fields, implantable medical devices, stray voltage, inducted voltage, and air quality;
- Effects on land-based economies (factor C), including the factor elements – agriculture, forestry, mining, and recreation and tourism;
- Effects on archaeological and historic resources (factor D);
- Effects on the natural environment (factor E), including the factor elements – flora, fauna, and water and air quality;
- Electrical systems reliability (factor K);

³⁴³ Id. Does not include possible wetland mitigation costs.

Though there is a small difference in wetland impacts between the western substation site and the proposed substation site (0 acres vs. 0.27 acres), this difference is not anticipated to result in significantly different impacts to the natural environment (factor E).

Routing Factors for Which Impacts are Anticipated to Vary Between Routing Options

There is one routing factor for which impacts are anticipated to vary significantly between the western Blueberry substation site alternative and the proposed Blueberry substation site. This factor is:

- Costs which are dependent on design and route (factor L).

This factor is summarized here and in **Figure 17**.

Costs which are Dependent on Design and Route

The cost of the western Blueberry substation site alternative is higher than the proposed Blueberry substation site by approximately \$430,000 dollars (**Table 22**). The cost is higher due to the need to extend the existing 34.5 kV line and existing distribution lines that will connect at the substation westward approximately one mile to reach the western Blueberry substation site.

Figure 17. Relative Merits of Western Blueberry Substation Site Alternative and Proposed Blueberry Substation Site³⁴⁴

Routing Factor / Element	Applicants' Proposed Blueberry Substation Site	Western Blueberry Substation Site Alternative	Summary
Costs Dependent on Design and Route			The cost of the western Blueberry substation site alternative is higher than the proposed Blueberry substation site

6.3 Blueberry to Red Eye Route Alternatives

There are four route alternatives that could be used to connect the Blueberry substation to the Red Eye substation: East of 109th Ave., 119th Ave., Pipeline South and U.S. Route 71 (**Figure 5**). The discussion here compares these route alternatives to each other and to the comparable segment of the applicants' proposed route – that segment from Blueberry substation to the Red Eye substation.

Human Settlements

Impacts to human settlements are impacts related to: aesthetics, noise, displacement, property values, economics, cultural values, electronic interference, and zoning and land use compatibility (see Section 5.3). Impacts to human settlements along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route – they are anticipated to be minimal.

³⁴⁴ See Figure 15 for a guide to the relative merits graphic.

Though impacts are anticipated to be minimal, the one element of human settlements where impacts are anticipated to vary among the Blueberry to Red Eye route alternatives and the proposed route is aesthetics. As discussed in Section 5.3, the primary strategy for minimizing aesthetic impacts is prudent routing, i.e., choosing routes and alignments that are most harmonious with the landscape. Aesthetic impacts of the project can be minimized by placing the project away from residences.

All of the Blueberry to Red Eye route alternatives are near fewer residences than the proposed route (**Table 23**). The Pipeline South and East of 109th Ave. route alternatives are near the fewest residences. Three of the route alternatives – East of 109th Ave., 119th Ave, and U.S. Route 71 – have residences that are closer to the anticipated alignment than the proposed route (within 51 to 100 feet) (**Table 23**).

Aesthetic impacts can also be mitigated by placing like with like – i.e., by placing new transmission infrastructure where there is already existing linear infrastructure. The 119th Ave., Pipeline South, and U.S. Route 71 route alternatives and the proposed route make the best use of existing infrastructure ROW (**Table 24**). The East of 109th Ave. route alternative utilizes relatively less infrastructure ROW but does utilize field boundaries.

Though the Pipeline South route alternative utilizes existing pipeline ROW, it would introduce new aboveground infrastructure that runs diagonally across the landscape (**Figure 5**). Accordingly, it does not place like with like in the same manner as a transmission line along existing roadway ROW, where there is already aboveground infrastructure, i.e., the roadway surface and associated signage.

On whole, the Pipeline South and East of 109th Ave. route alternatives are near the fewest number of residences. The proposed route and the 119th Ave. and U.S. Route 71 route alternatives minimize aesthetic impacts by putting like infrastructure with like.

Table 23. Distance of Residences from Anticipated Alignment – Blueberry to Red Eye Route Alternatives and Proposed Route³⁴⁵

Route	0 to 50 feet	51 to 100 feet	101 to 150 feet	151 to 200 feet	201 to 250 feet	Total
East of 109 th Ave.	0	1	0	3	1	5
119 th Ave.	0	1	0	5	1	7
Pipeline South	0	0	2	0	0	2
U.S. Route 71	0	2	2	2	3	9
Proposed Route	0	0	2	8	4	14

³⁴⁵ Additional Project Information from Applicants.

Table 24. Use of Existing ROW – Blueberry to Red Eye Route Alternatives and Proposed Route³⁴⁶

Route	Total Length (miles)	Length Following Roadway, Pipeline, or Transmission Line ROW (miles percent)	Length Following Field Boundaries (miles percent)
East of 109 th Ave.	7.51	4.42 59%	2.67 36%
119 th Ave.	7.55	6.75 89%	2.36 31%
Pipeline South	5.70	5.65 99%	0.52 9%
U.S. Route 71	7.55	7.50 99%	1.87 25%
Proposed Route	7.85	7.44 95%	1.84 23%

Public Health and Safety

Impacts to public health and safety along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.4).

Public Services

Impacts to public services along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.5).

Land-Based Economies

Impacts to land-based economies are impacts to agriculture, forestry, mining and recreation and tourism (see Section 5.6). Impacts to mining and recreation and tourism along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal. There are gravel pits in the southern project area, particularly along the 119th Ave. route alternative (**Appendix E**, Map E2). However, impacts to these gravel pits are anticipated to be minimal with use of any of the Blueberry to Red Eye route alternatives. The U.S. Route 71 route alternative crosses a Wadena County snowmobile trail (**Appendix E**, Map E3).³⁴⁷ Impacts to this trail if this route alternative were selected for the project are anticipated to be minimal.

Impacts to agriculture and forestry are anticipated to vary among the Blueberry to Red Eye route alternatives and the proposed route. All of the routing options impact in the range of 50 to 70 acres of agricultural land except for the Pipeline South route alternative which impacts approximately 36 acres (**Table 25**). As discussed in Section 5.6, permanent impacts to agricultural operations are generally limited to pole locations. Thus, the difference in impacts to agricultural operations between the routing options is anticipated to be minimal.

³⁴⁶ Id. Percentages do not sum to 100 percent because, in some areas, the routing options utilize both infrastructure ROWs and field boundaries.

³⁴⁷ Additional Project Information from Applicants.

All routing options impact about 22 acres of forested land except for the East of 109th Ave. route alternative, which impacts approximately 29 acres, and the proposed route, which impacts approximately 18 acres (**Table 25**). Impacts to forested acres are not limited to pole locations – they extend throughout the transmission line ROW. Though the difference in impacted acres is relatively small among routing options, it is anticipated that the East of 109th Ave. route alternative would impact forestry operations to a greater extent than the proposed route.

Table 25. Agricultural and Forested Acres Within ROW – Blueberry to Red Eye Route Alternatives and Proposed Route³⁴⁸

Route	Agricultural Acres Within ROW (100 ft.)	Forested Acres Within ROW (100 ft.)
East of 109 th Ave.	55.01	28.88
119 th Ave.	60.76	22.40
Pipeline South	35.73	22.02
U.S. Route 71	52.76	22.73
Proposed Route	70.03	17.80

Archaeological and Historic Resources

Impacts to archaeological and historic resources along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.7).

Water Resources

Impacts to water resources are impacts to surface waters, floodplains, groundwater, and wetlands (see Section 5.8). With the exception of wetlands, impacts to water resources along the Blueberry to Red Eye route alternative are anticipated to be similar to those along the proposed route and minimal.

Impacts to wetlands vary among the Blueberry to Red Eye route alternatives and the proposed route (**Table 26**). The East of 109th Ave. and 119th Ave. route alternatives and the proposed route impact relatively fewer wetlands. The Pipeline South and U.S Route 71 route alternatives impact relatively more wetlands, including forested wetlands.

As discussed in Section 5.8, forested wetlands within the transmission line ROW would likely undergo a permanent change of vegetation type as a result of the project. The U.S. Army Corps of Engineers (USACE) may require wetland mitigation for the conversion of forested wetlands to non-forested wetlands.³⁴⁹

³⁴⁸ Id.

³⁴⁹ CN and Route Permit Application, Section 9.6.2.

Table 26. Wetlands Within ROW – Blueberry to Red Eye Route Alternatives and Proposed Route³⁵⁰

Route	Forested Wetlands Acres Within ROW (100 ft.)	Total Wetland Acres Within ROW (100 ft.)
East of 109 th Ave.	2.02	3.73
119 th Ave.	2.87	4.06
Pipeline South	5.32	8.63
U.S. Route 71	7.61	10.13
Proposed Route	2.03	4.13

Soils

Impacts to soils along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.9).

Flora

Impacts to non-tree flora along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.10). However, impacts to trees along the East of 109th Ave. route alternative are anticipated to be greater than impacts along the proposed route (**Table 25**).

Fauna

Impacts to fauna along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.11). Because of the relatively good habitat for avian species in the project area, impacts to avian species could range from minimal to moderate. However, these impacts can be mitigated through the use of bird flight diverters. The USFWS has indicated a need for bird flight diverters near the Red Eye WMA.³⁵¹ The USFWS has also indicated that raptor perch deterrents would be appropriate for transmission line structures near the Red Eye WMA.³⁵²

Rare and Unique Natural Resources

Impacts to rare and unique natural resources along the Blueberry to Red Eye route alternatives are anticipated to be similar to those along the proposed route and minimal (see Section 5.12). Impacts to trees for all routing options are similar, with the East of 109th route alternative impacting relatively more trees and the proposed route relatively fewer (**Table 25**). Because impacts to trees are similar, any possible impacts to NLEB roosting habitat are anticipated to be similar. The USFWS recommends minimizing the removal of trees that could be used as roosting habitat for the NLEB. The USFWS has

³⁵⁰ Additional Project Information from Applicants.

³⁵¹ CN and Route Permit Application, Section 9.6.3.

³⁵² Id.

indicated that an incidental take permit may be necessary for projects that result in greater than one acre of tree removal.

The U.S Route 71 route alternative crosses habitat for a rare snake species, the Eastern Hog-Nosed Snake (**Appendix E**, Map E7). Because this route alternative makes extensive use of existing ROW (**Table 24**), impacts to this habitat and to the snake itself are anticipated to be minimal.

Costs which are Dependent on Design and Route

Costs vary among the Blueberry to Red Eye route alternatives and the proposed route (**Table 27**). The East of 109th Ave. and 119th Ave. route alternatives and the proposed route are relatively less expensive to construct. The Pipeline South route alternative, although the shortest in length, is the most expensive to construct. This is due, in part, to the expense of constructing in lowland areas and wetlands.

Table 27. Estimated Costs – Blueberry to Red Eye Route Alternatives and Proposed Route³⁵³

Route	Estimated Cost (dollars)
East of 109 th Ave.	3.83 million
119 th Ave.	4.23 million
Pipeline South	5.13 million
U.S. Route 71	4.62 million
Proposed Route	4.34 million

Relative Merits of Blueberry to Red Eye Route Alternatives

This section utilizes the routing factors of Minnesota Rule 7850.4100 and factor elements to analyze the relative merits of the Blueberry to Red Eye route alternative and the applicants’ proposed route. This section uses the same graphic representation and mode of discussion as Section 6.1.

Routing Factors for Which Impacts are Not Anticipated to Vary Between Routing Options

There are several routing factors, and factor elements, for which impacts are not anticipated to vary significantly among the Blueberry to Red Eye route alternatives and the proposed route. These are:

- Effects on human settlements (factor A) for the factor elements – noise, displacement, property values, economics, cultural values, electronic interference, zoning and land use compatibility, and public services;

³⁵³ Additional Project Information from Applicants. Includes estimates of wetland mitigation costs. Wetland mitigation costs are difficult to determine without final line design and because of unknown variables such as wetland impact ratios and wetland credit costs and availability.

- Effects on public health and safety (factor B), including the factor elements – electric and magnetic fields, implantable medical devices, stray voltage, inducted voltage, and air quality;
- Effects on land-based economies (factor C) for the factor elements – agriculture, mining, and recreation and tourism;
- Effects on archaeological and historic resources (factor D);
- Effects on the natural environment (factor E), for the factor elements – fauna and water and air quality;
- Electrical systems reliability (factor K);

Though there is a difference in wetland impacts between the routing options, this difference is not anticipated to result in significantly different water quality impacts (factor E). It will result in differential impacts to flora (discussed below).

Routing Factors for Which Impacts are Anticipated to Vary Between Routing Options

There are several routing factors, and factor elements, for which impacts are anticipated to vary significantly among the Blueberry to Red Eye route alternatives and the proposed route. These are:

- Effects on human settlements (factor A) for the factor element aesthetics;
- Effects on land-based economies (factor C) for the factor element forestry;
- Effects on the natural environments (factor E), for the factor element flora;
- Use of existing rights-of-way (factors H and J);
- Cost which are dependent on design and route (factor L).

These factors and factor elements are summarized here and in **Figure 18**.

Human Settlements – Aesthetics

The Pipeline South and East of 109th Ave. route alternatives are near the fewest residences. The 119th Ave. and U.S. Route 71 route alternatives and the proposed route minimize aesthetic impacts by putting like infrastructure with like.

Land-Based Economies – Forestry

Impacts to forestry are similar across all routing options. The East of 109th Ave. route alternative impacts the greatest number of forested acres; the proposed route the least.

Natural Environment – Flora

Impacts to non-tree flora are similar across routing options. Impacts to trees are also similar; however, the East of 109th route alternative impacts relatively more trees and the proposed route relatively fewer. The Pipeline South and U.S Route 71 route alternatives impact relatively more forested wetlands. Use of these route alternatives would permanently change these wetlands to non-forested wetlands.

Use of Existing ROW

The 119th Ave., Pipeline South, and U.S. Route 71 route alternatives and the proposed route make the best use of existing ROW. The East of 109th Ave. route alternative utilizes relatively less existing ROW but does utilize field boundaries.

Costs which are Dependent on Design and Route

The costs of the Blueberry to Red Eye route alternatives and the proposed route are very similar. The East of 109th Ave. alternative is anticipated to be less expensive than other routing options. The Pipeline South route alternative is anticipated to be more expensive than other routing options.

Figure 18. Relative Merits of Blueberry to Red Eye Route Alternatives and Proposed Route³⁵⁴

Routing Factor / Element	Applicants' Proposed Route	East of 109 th Ave.	119 th Ave.	Pipeline South	U.S. Route 71	Summary
Human Settlements / Aesthetics						The Pipeline South and East of 109 th Ave. route alternatives are near the fewest residences. The proposed route and the 119 th Ave. and U.S. Route 71 route alternatives place like infrastructure with like.
Land-Based Economies / Forestry						The East of 109 th Ave. route alternative impacts relatively more forested acres. The proposed route impacts the fewest number of forested acres.
Natural Environment / Flora						The East of 109 th Ave. route alternative impacts relatively more trees. The proposed route impacts the fewest number of trees. The Pipeline South and U.S. Route 71 route alternatives impact relatively more forested wetlands.
Use of Existing ROW						The 119 th Ave., Pipeline South, and U.S. Route 71 route alternatives and the proposed route make the best use of existing ROW. The East of 109 th Ave. route alternative utilizes relatively less ROW but utilizes field lines where it does not follow existing ROW.
Costs Dependent on Design and Route						The Pipeline South route alternative is anticipated to be more expensive than other routing options.

³⁵⁴ See Figure 15 for a guide to the relative merits graphic.