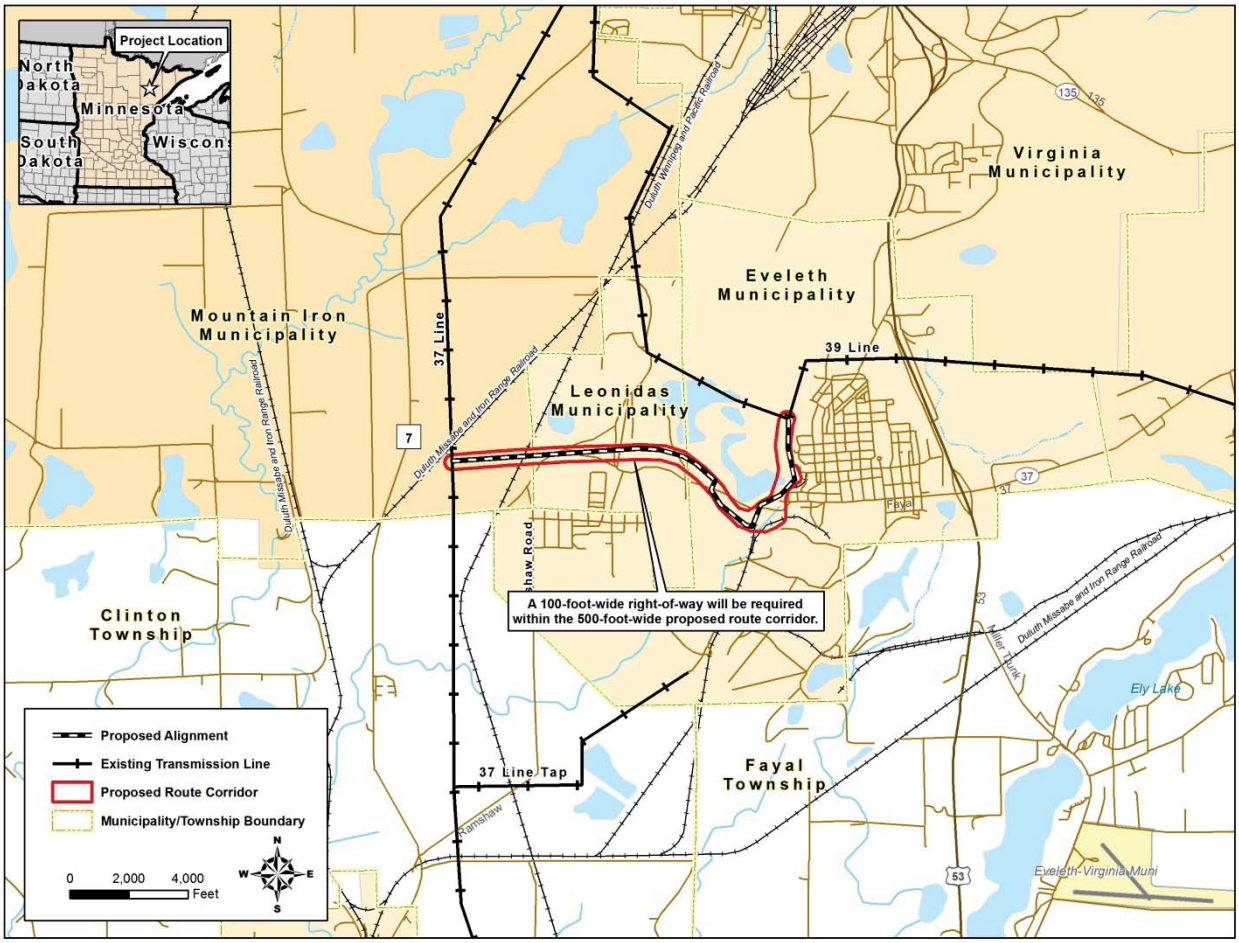
ENVIRONMENTAL ASSESSMENT

MP 39 LINE RELOCATION TRANSMISSION PROJECT

PUC DOCKETS
E015/TL-12-1123



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Abstract

Minnesota Power (Applicant) submitted an application to the Minnesota Public Utilities Commission for a high voltage transmission line (HVTL) Route Permit to construct approximately 3.0 miles of new 115 kV transmission line in St. Louis County near the city of Eveleth, Minnesota.

The Applicant submitted its HVTL route permit application to the Commission on November 26, 2012. The route permit application was accepted as complete by the Commission on January 16, 2013. The docket number for the HVTL Route Permit proceedings is E015/TL-12-1123.

Under the Power Plant Siting Act (Minn. Stat. 216E), a route permit from the Commission is required to construct a high voltage transmission line (HVTL). Department of Commerce, Energy Facility Permitting (EFP) staff is responsible for conducting the environmental review for route permit applications submitted to the Commission (Minn. Rules 7850). Accordingly, EFP staff has prepared this environmental assessment (EA) for the MP 39 Line Relocation project. This EA addresses the issues required in Minnesota Rule 7850.3700, subpart 4, and those identified in the Department's scoping decision of April 17, 2013.

Persons interested in this project can place their names on the Department's project mailing list by registering online at: http://mn.gov/commmerce/energyfacilities/Docket.html?Id=32972 or by contacting Bill Storm, Energy Facilities Permitting, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone: (651) 539-1844, e-mail: bill.storm@state.mn.us. Documents of interest can be found at the above website and on the eDockets system: https://www.edockets.state.mn.us/EFiling/search.jsp (enter the year "12" and the number "1123").

Following release of this environmental assessment, 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 route permit application will be presented to the Commission for a final decision. A decision on a route permit for the MP 39 Line Relocation project is anticipated in November 2013.

Acronyms, Abbreviations and Definitions

ALJ	Administrative Law Judge
Commission	Minnesota Public Utilities Commission
dBA	A-weighted sound level recorded in units of decibels
EA	Environmental Assessment
EFP	Department of Commerce Energy Facilities Permitting
EMF	electromagnetic field
FEMA	Federal Emergency Management Agency
FHA	Federal Housing Administration
HVTL	high voltage transmission line
kV	kilovolt
MDH	Minnesota Department of Health
mG	milligauss
mg/L	milligrams per liter – equivalent to parts per million (ppm)
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MSIWG	Minnesota State Interagency Working Group
NAC	noise area classification
NESC	National Electrical Safety Code
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PWI	Public Waters Inventory
RAPID	U.S. EMF Research and Public Information Dissemination
ROW	Right-of-Way
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
USCOE	United States Corp of Engineers
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization

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1.0 Introduction

Minnesota Power (Applicant) has made an application to the Minnesota Public Utilities Commission (Commission) for a high voltage transmission line (HVTL) Route Permit for the construction of a new 115 kV transmission line in the St. Louis County pursuant to Minnesota Statutes Section 216E and Minnesota Rules Chapter 7850.

The Department of Commerce Energy Facility Permitting (EFP) staff is tasked with conducting environmental review on applications for route permits. The intent of the environmental review process is to inform the public, the applicant, and decision-makers about potential impacts and possible mitigations measures for the proposed project.

This environmental assessment (EA) addresses the issues noted in Minnesota Rule 7850.3700, subpart 4, and those identified in the Department's scoping decision for this project (**Appendix A**), and is organized as follows:

Section 1.0	**Introduction**	The introduction provides an overview of this document and of the proposed project. It also provides a summary of the potential impacts of the project and mitigative measures.
Section 2.0	**Regulatory Framework**	Section 2.0 describes the regulatory framework associated with the project, including certificate of need criteria, route permit requirements, and the alternative permitting process.
Section 3.0	**Proposed Project**	Section 3.0 describes the project as proposed by Minnesota Power, including rights-of-way, structures, and conductors.
Section 4.0	**Other Routes**	Section 4.0 describes routes considered and rejected, and any alternative routes or route segments that were developed through the EA scoping process.
Section 5.0	**Potential Impacts and Mitigation Measures**	Section 5.0 details the potential impacts of the proposed project to human and natural environments and identifies measures that could be implemented to avoid, minimize, or mitigate potential adverse impacts.
Section 6.0	**Unavoidable Impacts**	Section 6.0 describes the unavoidable impacts, and the irreversible and/or irretrievable commitment of resources resulting from the project.
Section 7.0	**Application of Routing Factors**	Section 7.0 applies the information and data available in the RPA and the EA to those factors described in Minnesota Rule 7850.4100.

1.1 Project Description

The proposed project covers a total of approximately 3.0 miles (**Figure 1**) of new 115 kV HVTL and rights-of-way (ROW), and the removal of approximately 1.9 miles of existing HVTL (current 39 Line) that runs through United Taconite's north pit.

1.2 Project Location

The project is located in central St. Louis County, near the cities of Mountain Iron, Eveleth and Leonidas.

Table 1 below summarizes the proposed project location.

Table 1. Project Location

County	PLS Township (N)	PLS Range (W)	PLS Sections
St. Louis	58	17	31
St. Louis	57	17	6
St. Louis	58	18	35, 36

PLS – Public Land Survey System

1.3 Project Purpose

United Taconite has requested that Minnesota Power remove an existing 115 kV HVTL to accommodate United Taconite's plans to extend its mining operation located west of Eveleth. The project (i.e., installation of 3.0 miles of HVTL) is needed to allow this existing line to be removed without degrading the area's high voltage transmission system.

In order to accommodate the future mining expansion of United Taconite's North Pit, Minnesota Power will remove the portion of existing transmission line located in Sections 25 and 36 of Township 58 North-Range 18 West and Section 31 of Township 58 North-Range 17 West. The area to be temporarily disturbed will be limited to within the existing right-of-way that Minnesota Power owns. After that portion of the line is removed, the area will be mined.

1.4 Sources of Information

Much of the information used in this Environmental Assessment is derived from documents prepared by Minnesota Power, including the HVTL Route Permit Application, November 26, 2012. Discussion of Electromagnetic Field (EMF) issues came primarily from the white paper developed by the Interagency Task Force led by the Minnesota Health Department, the National Institute for Environmental Health, and the World Health Organization. Additional information comes from earlier Energy Facility Permitting environmental review documents in similar dockets, other state agencies, such as the Department of Natural Resources, and additional research. Firsthand information was gathered by site visits along the proposed line.

2.0 Regulatory Framework

Persons seeking to construct and operate a high voltage transmission line in Minnesota must seek permission(s) to do so from the Minnesota Public Utilities Commission (Commission).

2.1 Certificate of Need

No person may construct a large energy facility in Minnesota without a certificate of need from the Commission (Minn. Stat. 216B.243). A 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 (Minn. Stat. 216B.2421).

For the Minnesota Power 39 Line relocation project a Certificate of Need is not required because the project is not classified as a large energy facility under Minnesota Statutes Sections 216B.243 and 216B.2421, subdivision 2(3). While the project is a HVTL with a capacity of 100 kV or more, it is not more than 10 miles long in Minnesota and it does not cross a state line.

Therefore, the project is exempt from the Certificate of Need requirements.

2.2 Route Permit

Minnesota Statutes Section 216E.03, subd. 2, provides that no person may construct a HVTL without a route permit from the Commission. An HVTL is defined as a transmission line of 100 kV or more and greater than 1,500 feet in length in Minnesota Statutes Section 216E.01, subd. 4. The proposed transmission lines are HVTLs and therefore a route permit is required prior to construction.

The Applicant submitted the HVTL route permit application for the proposed MP 39 Line relocation pursuant to the provisions of the Alternative Permitting Process outlined in Minnesota Rules 7849.2900. The alternative permitting process includes environmental review and public hearings, and typically takes six months.

A copy of the HVTL route permit application, along with other relevant documents, can be reviewed at the Energy Facility Permitting web page at:

http://mn.gov/commerce/energyfacilities/Docket.html?Id=32972

The EFP staff is responsible for evaluating the HVTL route permit application and administering the environmental review process. The Commission is responsible for selecting the transmission lines routes and issuing the HVTL route permit.

Environmental Review

Environmental review under the alternative permitting process includes public information/scoping meetings and the preparation of an environmental review document, the Environmental Assessment (EA) (Minn. R. 7850.3700). The environmental assessment is a written document that describes the human and environmental impacts of the transmission line project (and selected alternative routes) and methods to mitigate such impacts.

The Deputy Commissioner of the Department of Commerce (Commissioner) determines the scope of the EA. The EA must be completed and made available prior to the public hearing.

2.3 Scoping Process

On February 4, 2013, Commission staff sent notice of the place, date and times of the Initial Public Information and Scoping meeting to those persons on the General List maintained by the Department, the agency technical representatives list and the project contact list.[1]

Additionally, mailed notices were sent to those persons on Minnesota Power's property owners list and to the local units of government. Notice of the public meeting was also published in the local newspapers.

On Monday, February 25, 2013, Commission staff and EFP staff jointly held two public information/scoping meetings at the Leonidas Community Center in Eveleth. The meetings included two sessions, one starting at 2:00 pm and another starting at 6:00 pm. 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 alternatives and impacts (i.e., scope) that should be considered during preparation of the environmental review document.

Approximately 10 people attended the public information and scoping meetings; 2 individuals took the opportunity to speak on the record. A court reporter was present to document oral statements.[2]

A variety of topics were discussed during the presentation. Topics included: specifics on which lines and poles will be removed, and design/construction of any new poles; specifics on the proposed alignment; the concepts of route width and right-of-way/easement width; sources of power generation for this project; health and safety issues; property values; compensation for easements; and flexibility in siting the final alignment.

Written comments were due no later than Friday, March 11, 2013.

Three written comments were received: two from state agencies (Department of Natural Resources and Department of Transportation) and one from the St. Louis County Agricultural Inspector.[3]

[1] Notice of Public Information/Scoping Meeting, eDocket No. 20132-83532-01
[2] Oral Comments Received During Scoping, eDocket No. 20133-84874-01

The Department of Natural Resources (MnDNR) in its comment letter discussed the use of wildlife friendly erosion control mats; issues associated with vegetation management and invasive species; policies regarding the crossing of public land and water; and various construction practices.

While not recommending any specific alternative routes in accordance with Minnesota Rule 7850.3700, the MnDNR did encourage the consideration of alternative routes along existing corridors in its comment letter.

The Department of Transportation (MnDOT) in its letter recognized that it appears that the project area does not directly abut any state trunk highway; however, the agency did request that it be made aware of any changes to the proposed HVTL that may bring the project area close enough to occupy a portion of current MnDOT rights-of-way (ROW). Additionally, MnDOT requested that it be informed if the transportation and/or storage of structures have the potential to affect any MnDOT ROW.

The St. Louis County Agricultural Inspector expressed concern with the potential movement of noxious and invasive weed species, specifically Tansy, Canada Thistle and Spotted Knap Weed. In his letter, the inspector discussed the precautions and permits that may be required to prevent the spread of these weeds.

The process for individuals to request that specific alternative routes, alternative route segments, and/or alignment modifications be included in the scope of the environmental review document was discussed at the public meeting.

Proposed Alternatives
No alternative routes were put forth during the EA scoping comment period.

Applicant Comments
On March 22, 2013, Minnesota Power filed its response to the comments received during the scoping period.[4]

In its response comments, Minnesota Power acknowledges that the Applicant will work with the MnDNR and MnDOT, and will provide the EFP staff with the information it requires to adequately address these agencies' concerns in the environmental review document.

In regard to the MnDNR's comment concerning following or using existing corridors, Minnesota Power stated that it did considered following Highway 101 west all the way to its intersecting point with the 37 Line (as opposed to deviating from Highway 101 for the remaining 4,000 feet as the proposed route does).[5]

[3] Written Comments Received During Scoping, eDocket No. 201133-84874-01 to -06
[4] Minnesota Power response to scoping comments, eDocket No. 20133-84953-01
[5] Minnesota Power response to scoping comments, eDocket No. 20133-84953-01

Scoping Decision

On April 11, 2013, the Commission at its regularly scheduled meeting, considered what action, if any, the Commission should take in regards to the alternatives put forth during the scoping process; the Commission elected to take no action in this matter.

After consideration of the comments, the Deputy Commissioner issued his Scoping Decision on April 17, 2013. A copy of this order is attached in the **Appendix A**. The items and issues bought forth during the scoping process, along with the typical HVTL routing impacts, were incorporated into the Scoping Decision.

2.4 Public Hearing

The Commission is required by Minn. Rule 7849.5710 subp 1, and Minn. Rule 7850.3800 subp 1, to hold a public hearing once the EA has been completed. It is anticipated that this hearing will be held in early September 2013, in the project area; the hearing will be conducted by an Administrative Law Judge (ALJ).

The hearing will be noticed separately and details can be found online at http://mn.gov/commerce/energyfacilities/Docket.html?Id=32972 Interested persons may comment on the EA at the public hearing. Persons may testify at the hearing without being first sworn under oath. The ALJ will ensure that the record created at the hearing is preserved and will provide the Commission with a report setting forth findings, conclusions, and recommendations on the merits of the proposed transmission line project applying the routing criteria set forth in statute and rule.

Comments received on the Environmental Assessment become part of the record in the proceeding, but EFP staff is not required to revise or supplement the EA document. A final decision on the route permit will be made by the Commission at an open meeting following the public hearing and filing of the ALJ's report.

If issued a HVTL route permit by the Commission, Minnesota Power may exercise the power of eminent domain to acquire the land necessary for the project pursuant to Minnesota Statute 216E.12 and Minnesota Statute 117.

2.5 Final Decision

The Commission's obligation is to choose routes that minimize adverse human and environmental impacts while insuring continuing electric power system reliability and integrity, and also while insuring that electric energy needs are met and fulfilled in an orderly and timely fashion. Route permits contain conditions specifying construction and system operation standards (see a sample Route Permit in **Appendix B**).

There are a number of potential impacts associate with HVTLs that must be taken into account on any transmission line project. Minnesota Rule 7850.4100, A through N, identifies 14 factors that the Commission must consider when designating a route for a HVTL:

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

b. effects on public health and safety;

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

d. effects on archaeological and historic resources;

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

f. effects on rare and unique natural resources;

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

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

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

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

k. electrical system reliability;

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

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

n. irreversible and irretrievable commitments of resources.

The commission must make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the commission must state the reasons.

At the time the commission makes a final decision on the permit application, the commission shall determine whether the EA and the record created at the public hearing address the issues identified in the scoping decision.

The commission shall make a final decision on a site permit or a route permit application within 60 days after receipt of the record from the hearing examiner. 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.

2.6 Other Permits

The Public Utilities Commission HVTL route permit is the only State permit required for routing of high voltage transmission lines, but other permits may be required for certain construction activities, such as river crossings. **Table 2** includes a list of potential permits that may be required for Minnesota Power Energy to complete this project.

Table 2. Potential Required Permits

Jurisdiction and Permit	Requirement
Federal	
USCOE, Clean Water Act, Section 404 Permit	Required if dredging and filling activities will occur within jurisdictional wetlands. If the proposed activities are not eligible for coverage under the General Permit or Letter of Permission, an Individual Permit will be obtained from the USCOE.
State	
MPUC, Route Permit	Required for any high voltage transmission line.
MnDNR, License to Cross Public Waters	Required if any work is necessary in public waters.
MnDOT, Utility Permit	Required if placing utilities on or across a Minnesota trunk highway right-of-way.
MPCA, NPDES/SDS General Stormwater Permit for Construction Activity	Required under the NPDES/SDS General Stormwater Permit for Construction Activity where construction activities will cause more than one acre of ground disturbance.
MPCA, Section 401 Water Quality Certification	If the USCOE authorizes the Project under its GP/LOP permitting program as expected, the MPCA waives its Section 401 Water Quality Certification authority.
Local	
Moving Permit (Hauling)	Required whenever legal dimensions and/or axle weights are exceeded per county regulations.
Oversize/Overweight Vehicle Permit	Required on all county highways. May be required to move over-width loads on county, township, or city roads.
Railroad Crossing Permit	Required if crossing a railroad.

Once the Commission issues a Route Permit, local zoning, building and land use regulations and rules are preempted per Minn. Statute 216E.10, subd 1. However, the Applicant is still required to obtain relevant permissions, such as road crossing permits.

2.7 Applicable Codes

The transmission line, regardless of route location, must meet all requirements of the National Electrical Safety Code (NESC) for High Voltage Transmission Lines. These standards are

designed to protect human health and the environment. They also ensure 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 normal routine operational and maintenance is performed.

Utilities must comply with the most recent edition of the National Electric Safety Code, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or reinvesting capital in existing facilities. See Minn. Statute 326B.35 and Minn. Rule 7826.0300 subp 1.

The NESC is a voluntary utility developed set of standards intended to ensure that the public is protected. The NESC covers electric supply stations and overhead and underground electric supply and communication lines, and is applicable only to systems and equipment operated by utilities or similar systems on industrial premises. For more information, go to standards.ieee.org/faqs/NESCFAQ.html#q1. The Rural Utilities Service provides leadership and capital to "upgrade, expand, maintain, and replace America's vast rural electric infrastructure." For more information, go to http://www.usda.gov/rus/electric/index.htm.

2.8 Issues Outside the Scope of the EA

The EA does not consider the following:

- Any route alternatives not specifically identified in this scoping decision,
- The impacts of specific energy sources, such as carbon outputs from coal-generated facilities.
- The manner in which landowners are paid for transmission rights-of-way easements.

3.0 Proposed Project

The project is located in St. Louis County near and within the municipalities of Mountain Iron, Eveleth and Leonidas. **Figures 2 through 6** illustrate the proposed HVTL on aerial photographs.

The project includes the construction of approximately 3.0 miles of new 115 kV transmission line as part of the relocation of the MP 39 Line, which is currently located within United Taconite's north pit west of the city of Eveleth (**Figure 7**). The proposed route for the new HVTL runs between the existing Line 39 connection west of Eveleth to the connection with the existing 37 Line northwest of Leonidas.

The length of existing transmission line that will be removed is approximately 1.9 miles long.

3.1 Right-of-Way Requirements

The Applicant has requested a route width of 500 feet and a right-of-way (ROW) width of 100 feet.

Where the new HVTL parallels existing infrastructure (e.g., roads, railroads, other utilities), it may be possible to reduce the amount of new ROW obtained through ROW sharing with the existing infrastructure. In these cases, the HVTL shares the existing right-of-way, thereby reducing the size of the easement required from the private landowner.

As an example, where the HVTL is parallel to a roadway, the poles would be placed 5 feet within the private right-of-way adjacent to the roadway. Therefore, a little less than half of the line right-of-way will share the existing road right-of-way, resulting in an easement of lesser width being required from the landowner.

Minnesota Power will work within industry standard practices and the Minnesota Department of Transportation's (MnDOT) accommodation policy to position and manage the right-of-way along roadways.

Right-of-Way Acquisition

This project will require approximately 3.0 miles of new right-of-way. The evaluation and acquisition process would include title examination, initial owner contacts, survey work, document preparation and purchase. Most of the time, utilities are able to work with the landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights.

In some instances, a negotiated settlement cannot be reached and the landowner may choose to have an independent third party determine the value of the rights taken. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to Minn. Statute 117.

Table 3. Summary of Transmission Structures

Line Type	Structure Type	Structure Material	Right-of-Way Width (feet)	Structure Height (feet)	Foundation	Span Between Structures (feet)
115 kV Single Circuit	Single pole, horizontal or braced post insulator	Wood or laminated wood	100	60-105	Direct embedded for tangents and self-supporting for angle/ dead-end structures	250 to 350
115 kV Single Circuit	H-frame	Wood or laminated wood	100	60-70	Direct embedded for tangents and self-supporting for angle/dead-end structures	500-1,000

3.2 Project Construction and Maintenance

Minnesota Power's proposed 3.0 miles of 115 kV HVTL will be constructed with both monopole and H-Frame direct embedded wood structures. Monopole tangent structures will use wood or laminated wood poles with horizontal post or braced post insulators. Monopole angle structures will also be used that will utilize suspension insulators and may require guying. The structures will range in height from 60 to 105 feet above ground, and the spans adjacent to these structures will range from 250 to 350 feet (**Table 3**).

H-Frame structures will utilize two braced wood poles and suspension insulators. These structures will range in height from 60 to 70 feet above ground, and the spans adjacent to these structures will range from 500 to 1,000 feet. Pole height and span length for both structure types vary depending on topography and environmental constraints within the proposed right-of-way.

All structures will meet or exceed clearance and strength requirements given in the 2012 edition of the National Electrical Safety Code (NESC). Illustrations of the proposed structure types are shown below in **Figure 8.**

After land rights have been secured, landowners will be notified prior to the start of the construction phase of the project, including an update on the project schedule and other related construction activities.

The first phase of construction activities will involve survey staking of the transmission line centerline and/or pole locations, followed by removal of trees and other vegetation from the ROW. As a general practice, low-growing brush or tree species are allowable at the outer limits of the easement area. Taller tree species that endanger the safe and reliable operation of the

transmission facility will be removed. In developed areas and to the extent practical, existing low growing vegetation that will not pose a threat to the transmission facility or impede construction may remain in the easement area, as agreed to during easement negotiations.

The NESC states that "vegetation that may damage ungrounded supply conductors should be pruned or removed." Trees beyond the easement area that are in danger of falling into the energized transmission line (danger trees) will be removed or trimmed to eliminate the hazard, based on the terms in the easement that is acquired. Danger trees generally are those that are dead, weak or leaning towards the energized conductors. In special circumstances, tree trimming agreements may be possible to minimize tree removal based on negotiations with individual landowners.

All biomass materials resulting from the clearing operations will be chipped on site and spread on the ROW, stacked in the ROW for use by the property owner, or removed and disposed of as agreed to with the property owner during easement negotiations.

The final survey staking of pole locations may again occur after the vegetation has been removed and just prior to the structure installation.

The second phase of construction will involve structure installation and stringing of conductor wire. During this phase, underground utilities are identified through the required One-Call process to minimize conflicts with the existing utilities along the routes.

If temporary removal or relocation of fences is necessary, installation of temporary or permanent gates would be coordinated with the landowner. During the construction process, it may be necessary for the property owner to remove or relocate equipment and livestock from the ROW.

Transmission line structures are generally designed for installation at existing grades. Therefore, structure sites will not be graded or leveled unless it is necessary to provide a reasonably level area for construction access and activities. If vehicle or installation equipment cannot safely access or perform construction operations properly near the structure, minor grading of the immediate terrain may be necessary.

The Applicant will employ industry-specific best management practices (BMPs). BMPs address ROW clearance, erecting transmission line structures and stringing transmission lines. BMPs for each specific project are based on the proposed schedules for activities, prohibitions, maintenance guidelines, inspection procedures and other practices. In some cases these activities, such as schedules, are modified to incorporate BMP construction that will assist in minimizing impacts for sensitive environments. Any contractors involved in construction of the transmission line will be advised of these BMP requirements.

The new structures are installed directly in the ground, by augering or excavating a hole typically 7 to 10 feet deep and 2 to 3 feet in diameter for each pole. Any excess soil from the excavation

will be spread and leveled near the structure or removed from the site, if requested by the property owner or regulatory agency.

The new structures will then be set and the holes back-filled with the excavated material, native soil, or crushed rock. In poor soil conditions, a galvanized steel culvert is sometimes installed vertically with the structure set inside. The Applicant does not anticipate the use of concrete foundations, but if it were to be required, the size of the hole for concrete foundations depends largely on soil type. Based on the known soil types in northeastern Minnesota, it is anticipated that the average structure depth of a typical 65 foot long pole would be approximately 8.5 feet deep. Drilled pier foundations may vary from 4 to 8 feet in diameter. Concrete trucks are normally used to bring the concrete in from a local concrete batch plant.

After a number of new structures have been erected, the Applicant will begin to install the new static wire by establishing stringing setup areas within the ROW. Conductor stringing operations require brief access to each structure to secure the conductor wire to the insulators or to install shield wire clamps once final sag is established. Temporary guard or clearance structures are installed, as needed, over existing distribution or communication lines, streets, roads, highways, railways or other obstructions after any necessary notifications are made or permits obtained. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables and also protects the conductors from possible damage.

Crossing of rivers, streams and wetlands may require specific methods during construction. The transmission lines will cross two water bodies (a drainage ditch and Elbow Creek) and 0.7 miles of wetlands. Construction equipment crews will not be allowed to drive across waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. In areas where construction occurs close to waterways, BMPs help prevent soil erosion and ensure that equipment fueling and lubricating occur at a distance from waterways.

The principal operating and maintenance costs for transmission facilities are the costs of inspections and vegetation management. Inspection costs include 1 to 2 annual helicopter inspections, annual fixed wing patrol inspection, ground line inspections every 8 years, and pole climbing inspections as necessary. For wood structure HVTLs with voltages ranging from 115 kV through 230 kV, experience shows that the scheduled maintenance cost is approximately $105 per mile per year; pole climbing inspections are budgeted and scheduled as necessary. Vegetation management is performed on a 7-year cycle at an approximate average annual cost of $480 per mile. Annual operating and maintenance costs for HVTLs in Minnesota and the surrounding states vary. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

Vegetation Removal and Management

The purpose of vegetation removal and management is to keep transmission facilities clear of tall growing trees, brush, and other vegetation that could grow close to the conductors, and to allow for construction vehicle access to and between structures.

BMPs attempt to limit ground disturbance during construction wherever possible. However, disturbance will occur during the normal course of work, which can take several weeks in any one location. As construction is completed, Minnesota Power will restore disturbed areas to their original condition to the maximum extent practicable. Right-of-way agents will attempt to contact each property owner after construction is completed to assess if any remaining damage has occurred as a result of the project. If damage has occurred to the property, Minnesota Power will fairly reimburse the landowner for the damages sustained that are not repaired or restored by Minnesota Power or its representatives.

In some cases, Minnesota Power may engage an outside contractor to restore the damaged property as nearly as possible to its original condition. Portions of vegetation that are disturbed or removed during construction of HVTLs will naturally reestablish to pre-disturbance conditions. Resilient species of common grasses and shrubs typically reestablish with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed HVTL may require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include re-seeding and mulching, erosion control blankets, silt fence installation, and minimizing soil disturbance during construction.

To avoid adversely impacting reptile and bird species, Minnesota Power will not use plastic mesh erosion control materials and will adhere to the MnDNR's wildlife friendly erosion control guidance.

These erosion control and vegetation establishment practices are regularly used in construction projects and will be incorporated in the Applicant's construction plans. These construction techniques typically minimize long-term impacts that may result from the project. The Minnesota Noxious Weed Law (Minnesota Statutes Section 18.75-18.91) defines a noxious weed as an annual, biennial, or perennial plant that the Commissioner of Agriculture designates to be injurious to the public health, the environment, public roads, crops, livestock, or other property. the Minnesota Department of Agriculture's Noxious & Invasive Weed Program assists local governments and landowners with resources for managing noxious and invasive weeds throughout Minnesota. Minnesota Power will attempt to limit the spread of noxious and invasive weeds by cleaning construction equipment before it enters the construction work area and using only invasive-free mulches, topsoil, and seed mixes. Permanent vegetation will be established in areas disturbed within the construction work area except in actively cultivated areas and standing water wetlands. Seed used will be purchased on a "Pure Live Seed" basis for seeding revegetation areas. The seed tags on the seed sacks will also certify that the seed is "Noxious Weed Free."

Minnesota Power may use both herbicides and/or mechanical methods to control the spread of noxious weeds. Minnesota Power will only use herbicides approved by the U.S. Environmental Protection Agency and the State of Minnesota Department of Agriculture. These herbicides are to be applied by commercial pesticide applicators that are licensed by the Minnesota Department of Agriculture. If during post-construction monitoring of the restored right-of-way a higher density and cover of noxious weeds on the right-of-way is noted when compared to adjacent off right-of-way areas, Minnesota Power will obtain landowner permission and work to mitigate noxious weed concerns.

3.3 Project Implementation

The Applicant anticipates a winter 2013 in-service date. Construction would be expected to begin in summer of 2013. This schedule is based on information known as of the date of the application filing and upon planning assumptions that balance the timing of implementation with the availability of crews, material and other practical considerations. This schedule may be subject to adjustment and revision as further information is developed.

Project Costs

The Applicants have estimated that the installation of the new transmission line and removal of the existing transmission line would cost approximately $2 million, depending on final route selection and mitigation.

4.0 Other Routes and Route Segments

The process for individuals to request that specific alternative routes, alternative route segments, and/or alignment modifications be included in the scope of the environmental review document was discussed at the public meeting.

No alternative routes, alternative route segments, and/or alignment modifications were put forth during the EA scoping period. Therefore, this environmental assessment only addresses the human and environmental impacts associated with the proposed transmission line.

In developing its proposed route, Minnesota Power evaluated and rejected an alternative HVTL route (**Figure 9**) that also followed existing ROWs (i.e., HVTLs and railroad) for the majority of it length, originating east of Eveleth in Gilbert Township and terminating southwest of Eveleth where it interconnected with the 37 Line Tap.[6] This route was rejected due to its considerable length and greater impact on private landowners.

Minnesota Power also stated that it did consider following Highway 101 west all the way to its intersecting point with the 37 Line (as opposed to deviating from Highway 101 for the remaining 4,000 feet as the proposed route does).[7] Based on Minnesota Power's analysis and field reconnaissance of the area, Minnesota Power concluded that locating the transmission line along Highway 101 to its terminus with the 37 Line would result in more impacts (wetlands and human settlement) than the proposed alignment. Specifically, Minnesota Power stated that if Highway 101 were followed to the 37 Line, 3.29 acres of wetlands would be impacted versus the proposed route's 1.11 acres of wetland impacts for the proposed transmission line location. Further, Minnesota Power determined that following Highway 101 to the 37 Line would result in greater construction costs and would bring the line in close proximity to a residence located at the intersection of Minnesota Power's 37 Line and County Road 101. For these reasons, Minnesota Power did not propose a route following Highway 101 to the 37 Line in its Route Permit application.

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[6] RPA, p.4-2, figure B-9
[7] Minnesota Power response to scoping comments, eDocket No. 20133-84953-01

5.0 Potential Impacts of the Proposed Route

The construction of a transmission line involves both short and long-term impacts. An impact is a change in the status of the existing environment as a direct or indirect result of the proposed action. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and occur later or are further removed in distance, but are still reasonably foreseeable.

Impacts may be negative or positive and temporary or permanent or long-lasting. Short-term impacts are generally associated with the construction phase of the project and can include crop damage, soil compaction, and noise. Long-term impacts can exist for the life of the project and may include land use restrictions or modifications. Measures that would be implemented to reduce, minimize, or eliminate potential impacts are discussed under the appropriate topic and highlighted as necessary in this section.

It may be possible to mitigate potential impacts by adjusting the proposed route, selecting a different type of structure or pole, using different construction methods, or implementing any number of post-construction practices. The Commission can require route permit applicants to use specific techniques to mitigate impacts or require certain mitigation thresholds or standards to be met through permit conditions.

5.1 Description of Environmental Setting

The Minnesota Department of Natural Resources (MnDNR) and the U.S. Forest Service have developed an Ecological Classification System (ECS) for ecological mapping and landscape classification. There are eight levels of ECS units in the United States. Map units for six of these levels occur in Minnesota: Provinces, Sections, Subsections, Land Type Associations, Land Types, and Land Type Phases.

The project is located in St. Louis County, Minnesota, near the cities of Eveleth and Leonidas; this area lies within the *Laurentian Mixed Forest Province* under the ECS. This classification extends from northern Minnesota, Wisconsin, and Michigan, southern Ontario, and the less mountainous portions of New England.

In Minnesota, this Province covers a little more than 23 million acres (9.3 million hectare) of the northeastern part of the state and is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. The landscape ranges from rugged lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands.

Based on U.S. Geological Survey topographic maps, the project will be located in an area whose topography has been significantly altered by mining activities west of Eveleth and north of Leonidas.

The project lies within the ECS *Northern Superior Uplands Section* (NSU), which is characterized by glacially scoured bedrock terrain with thin and discontinuous deposits of coarse loamy till and numerous lakes.

This Section has high relief, reflecting the rugged topography of the underlying bedrock. The upland vegetation is remarkably uniform relative to that of other sections in the Laurentian Mixed Forest Province, consisting mostly of fire-dependent forests and woodlands. Forests with red and white pine were widespread in the past, mixed with aspen, paper birch, spruce, and balsam fir; much of the pine was cut in the late 1800s and early 1900s, leaving forests dominated mostly by aspen and paper birch. Jack pine forests are present on droughty ridges and bedrock exposures, as well as on local sandy outwash deposits.

The underlying geology and topography near Eveleth and Leonidas have been altered over time as a result of mining operations. Further, the surface topography and natural drainage ways have been impacted by the man-made development of public infrastructure (e.g., buildings, roads).

The northern forest habitats and associated wetlands of this Section support bald eagles, Canada lynx, spruce grouse, American bitterns, bobolinks, Connecticut warblers, gray jays, northern goshawks, ospreys, trumpeter swans, and northern brook lampreys.

5.2 Socioeconomic

According to the 2012 Census data, St. Louis County is 93.0 percent Caucasian; minority groups in the area constitute a very small percentage of the total population, averaging 7 percent in the county and between 2 and 5.5 percent in cities near the project.

Approximately 24 to 30 workers will be required by Minnesota Power for transmission line construction over an approximately 5 month time period.

The proposed route does not contain disproportionately high minority populations or low-income populations. Population and economic characteristics based on the 2012 U.S. Census are presented in **Table 4.**

There will be short-term impacts to community services as a result of construction activity and an influx of contractor employees during construction of the various segments of the project. Both utility personnel and contractors will be used for construction activities. The communities near the project should experience short-term positive economic impacts through the use of the hotels, restaurants and other services by the various workers.

Table 4. Population and Economic Profile, 2012

Location	Population	Minority Population (Percent)	Caucasian Population (Percent)	Median Household Income	Percentage of Individuals Below Poverty Level
State of Minnesota	5,344,861	13.1	86.9	57,243	10.6
St. Louis County	200,255	7.0	93.0	44,941	15.1
City of Eveleth	3,718	5.5	94.5	30,239	18.2
City of Leonidas	55	2.0	98.0	19,167	14.3

Source: RPA

It is not expected that additional permanent jobs will be created by the project. The construction activities will provide a seasonal influx of economic activity into the communities during the construction phase, and materials such as concrete may be purchased from local vendors. Long-term beneficial impacts from the project include increased local tax base resulting from the incremental increase in revenues from utility property taxes and extended mining activities.

Potential Impacts

Socioeconomic impacts resulting from the project will be primarily positive with an influx of wages and expenditures made at local businesses during the construction of the project, increased tax revenue and increased opportunities for business development.

Short-term impacts to existing socioeconomic resources would be relatively minor. The project construction would not cause permanent impacts to leading industries within the project area.

The relatively short-term nature of the project construction and the number of workers who would be hired from outside of the project area should result in short-term positive economic impacts in the form of increased spending on lodging, meals and other consumer goods and services. It is not anticipated that the project would create new permanent jobs during construction, but would create temporary jobs that would provide a short-term influx of income to the area.

If local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in St. Louis county would contribute to the total personal income of the region. Additional personal income would be generated for residents in the county and the state

by circulation and recirculation of dollars paid out by the applicant as business expenditures and state and local taxes. Expenditures made for equipment, energy, fuel, operating supplies and other products and services would benefit businesses in the counties and the state. Indirect impact may occur through the increased capability of the applicant to supply energy to commercial and industrial users, which would contribute to the economic growth of the region. There is no indication that any minority or low-income population is concentrated in any one area of the project, or that the transmission line would cross through an area occupied primarily by any minority group.

Long-term beneficial impacts to the county's tax base, as a result of the construction and operation of the transmission line, would be the incremental increase in revenue from utility property taxes which is based on the value of the project. The continued availability of reliable power in the area would have a positive effect on local businesses and the quality of service provided to the general public.

Property Values

Large electric generation facilities have the potential to impact property values. Because property values are influenced by a complex interaction between factors specific to each individual piece of real estate as well as local and national market conditions, the effect of one particular project on the value of one particular property is difficult to determine.

One of the first concerns of many residents near existing or proposed transmission lines is how the proximity to the line could affect the value of their property. Research on this issue does not identify a clear cause and effect relationship between the two. Rather, the presence of a transmission line becomes one of several factors that interact to affect the value of a particular property.

In the Final Environmental Impact Statement (EIS) on the Arrowhead-Weston Electric Transmission Line Project, the Wisconsin Public Service Commission addressed the issue of property value changes associated with high voltage transmission lines[8]. This document looked at approximately 30 papers, articles and court cases covering the period from 1987 through 1999.

> *In general there are two types of property value impacts that can be experienced by property owners affected by a new transmission line. The first is a potential economic impact associated with the amount paid by a utility for a right-of-way (ROW) easement. The second is the potential economic impact involving the future marketability of the property.*
>
> *However, substantial differences may exist between people's perceptions about how they would behave and their actual behavior when confronted with the purchase of property supporting a power line.*

[8] Final Environmental Impact Statement , Arrowhead –Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, pg 212-215

> *The presence of a power line may not affect some individual's perceptions of a property's value at all. These people tend to view power lines as necessary infrastructure on the landscape, similar to roads, water towers and antenna. They generally do not notice the lines nor do they have strong feelings about them.*

The Final EIS provides six general observations from the studies it evaluated. These are:

- The potential reduction in sale price for single family homes may range from 0 to 14 percent.
- Adverse effects on the sale price of smaller properties could be greater than effects 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.
- The adverse effects appear to diminish over time.
- Effects on sale price are most often observed for property crossed by or immediately adjacent to a power line, but effects have also been observed for properties farther away from the line.
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations.

Later, the Final EIS stated, "In coastal states, such as California and Florida, the decrease in property values can be quite dramatic; in states within the Midwest (Minnesota, Wisconsin and the Upper Peninsula of Michigan), the average decrease appears to be between 4 and 7 percent."

Finally, the EIS succinctly summarizes the dilemma in its closing paragraph which stated, "It is very difficult to make predictions about how a specific transmission line will affect the value of specific properties."

Based on the research that has been ongoing since at least the 1950s, several generalizations about the effect of transmission lines on property values can be made:[9]

- Studies have found a potential reduction of sale price for single-family homes of between 0 to 14 percent. Studies conducted in the upper Midwest (Minnesota, Wisconsin, and the Upper Peninsula of Michigan) have shown an average decrease of 4 to 7 percent.
- Although proximity to a transmission line does not appear to affect appreciation of a property, it can sometimes result in increased selling time.

[9] Final Environmental Impact Statement , Arrowhead –Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, pg 212-215

- Property characteristics such as the neighborhood, proximity to schools, lot size, square footage of the house, and other amenities, tend to exert a greater effect on sales place than the presence of a power line.
- High-value properties are more likely than lower-value properties to experience a reduction in sales price.
- The sales price of smaller properties could be more adversely affected than for larger properties.
- For upgrade projects, the level of opposition may affect the size and duration of any reduction in sales price.
- Adverse effects on property prices tend to be greatest immediately after a new transmission line is built and diminish over time.
- The sales price for properties crossed by or immediately adjacent to a transmission line appear to be more adversely affected than prices for homes that are not adjacent to the transmission line right-of-way or are greater than 200 feet from the transmission line right-of-way.
- Mitigation measures such as setback distance, landscaping and integration of the right-of-way into the neighborhood, and visual and noise shielding have been shown to reduce or eliminate the impact of transmission structures on sales price.
- Impacts to the value of agricultural property can be reduced by placing structures to minimize disruption to farm operations.[10]

Interviews with residents along existing transmission lines show that a high proportion of residents were aware of the lines at the time they purchased their home and between one-half and three-fourths expressed concerns about the lines. The concerns were related to health effects, aesthetics, and effects on property values. Despite the concerns expressed, 67 to 80 percent of survey respondents with negative feelings about transmission lines reported that their decision to purchase the property and the price they offered to pay was not affected by the lines.[11]

Although results of the studies have not been able to provide a basis for accurately predicting the effect of a particular transmission line on a particular property, researchers have attributed the effects of HVTLs on property values to an interaction between five factors:[12]

- Proximity to the transmission towers and lines
- The view of the towers and lines
- Size and type of HVTL structures
- Appearance of easement landscaping
- Surrounding topography

[10] Adapted from Wisconsin Public Service Commission, June 2001. *Environmental Impacts of Transmission Lines.* http://psc.wi.gov/thelibrary/publications/electric/electric10.pdf, p. 17.
[11] Chalmers, James A. and Frank A. Voorvaart. "High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects." *The Appraisal Journal.* Summer, 2009. http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/2009_HVTLs_and_Property_Values.pdf
[12] Pitts, Jennifer M. and Thomas O. Jackson. 2007. "Power Lines and Property Values Revisited." *The Appraisal Journal. Fall, 2007.*

Federal Housing Administration Regulations

The Federal Housing Administration (FHA) provides mortgage insurance on home loans made by FHA-approved lenders throughout the United States. In order to qualify for FHA mortgage insurance, a property must go through an appraisal and property condition assessment performed by an FHA-qualified appraiser. FHA qualified underwriters and appraisers are responsible for adhering to current the policies contained in the FHA's *Homeownership Center (HOC) Reference Guide.* With respect to overhead HVTLs, FHA guidance requires appraisers to review properties under consideration for FHA loans for presence of utility easements. The US Department of Housing and Economic Development provides the following guidance:

- *The appraiser must indicate whether the dwelling or related property improvements is located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc).*
- *If the dwelling or related property improvement is located within such an easement, the DE Underwriter must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements are not located within the tower's (engineered) fall distance in order to waive this requirement.*
- *If the dwelling and related property improvements are located outside the easement, the property is considered eligible and no further action is necessary. The appraiser, however, is instructed to note and comment on the effect on marketability resulting from the proximity to such site hazards and nuisances*.[13]

Mitigative Measures

Socioeconomic impacts resulting from construction activities associated with the project would be primarily positive with an influx of wages and expenditures made at local businesses during the project construction. Mitigative measures are not necessary.

In the matter of property values (for those properties receiving an easement) potential impact would typically be a negotiated settlement in an easement agreement between the Applicant and the landowner.

Locating the line away from homes to the extent possible and using line design and landscaping to minimize visual intrusions from the line can be used to minimize impacts to property values from the transmission line.

The presence of an HVTL easement on a property does not preclude qualification for FHA mortgage insurance, although the location of an easement on the property does require further documentation than would be required on properties without such easements.

[13] U.S. Department of Housing and Urban Development. *Is a Property eligible for FHA if there are overhead or high voltage power lines nearby?* http://portalapps.hud.gov/FHAFAQ/controllerServlet?method=showPopup&faqId=1-6KT-2009

5.3 Displacement

The Applicant does not anticipate that any existing structures along the proposed alignment would fail to meet the NESC safety codes; the proposed project will not require displacement of residences or commercial businesses.

Potential Impacts

Displacement of residential homes or businesses is not anticipated. However, it can be noted that the residences within the existing ROW could be impacted by the FHA issues discussed above, if the residence itself actually is within the "fall zone" of a structure. It may be possible for the Permittee to work with landowners to discuss advantageous placement of the new poles.

Mitigative Measures

Since no relocations would occur, no mitigative measures are required. It may be possible for the Permittee to work with landowners to discuss advantageous placement of the new poles if it is found that a residence lies within the previous mentioned fall zone.

5.4 Anticipated Noise Impacts

Noise is measured in units of decibels (dB) on a logarithmic scale. The A weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. For example, a noise level change of 3 dBA is barely perceptible to average human hearing while a 5 dBA change in noise level is noticeable. Two sources of noise would be associated with the completed Project: conductors and substations.

Land use activities associated with residential, commercial, and industrial land are grouped together into Noise Area Classifications (NAC). Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) noise limits for land use activities within the NAC. Table 8 shows the Minnesota Pollution Control Agency (MPCA) daytime and nighttime limits in dBA for each NAC (**Table 5**). The limits 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.

Typical noise sensitive receptors along the route would include residences, churches, and schools; however, most of the land use along the route is rural agricultural land. Current average noise levels in these areas are typically in the 30 to 40 dBA range and are considered acceptable for residential land use activities. Ambient noise in rural areas is commonly made up of rustling vegetation and infrequent vehicle pass-bys. Higher ambient noise levels, typically 50 to 60 dBA, would be expected near roadways, urban areas and commercial and industrial properties in the project area. Conductor and substation noise would comply with state noise standards.

Table 5. MPCA Daytime and Nighttime Noise Limits

Noise Area Classification	Daytime		Nightime	
	L50	L10	L50	L10
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

Noise concerns for this project may be associated with both the construction and operation of the energy transmission system. 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 to and from the work area. Any exceedences of the MPCA daytime noise limits would be temporary in nature and no exceedences of the MPCA nighttime noise limits are expected for this project.

Operational noise would be associated with the transmission conductors and transformers at substations that may produce audible noise under certain operational conditions. The level of noise depends on conductor conditions, voltage level and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of electricity ionizing the moist air near the wires. During heavy rain, the general background noise level is usually greater than the noise from a transmission line and few people are in close proximity to the transmission line in these conditions. For these reasons, audible noise is not noticeable during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, the proposed transmission lines may produce audible noise higher than rural background levels. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

Based on a review of recent aerial photography, there are 23 residences within 300 feet of the proposed centerline, of which one is within 100 feet of the centerline. Also, there are 13 commercial buildings within 300 feet of the proposed centerline, of which 2 are within 100 feet of the centerline.

Noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible. Therefore, noise levels from the new line and double circuit line should not be noticeably greater than existing levels.

The EPRI “Transmission Line Reference Book, 345kV and Above”, Chapter 6, provides empirically-derived formula for predicting audible noise from overhead transmission lines. Computer software produced by the Bonneville Power Administration (BPA) is also frequently used to predict the level of audible noise from power transmission lines that is associated with corona discharge. Audible noise is predicted for dry and wet conditions, with wet conditions

representing a worst case. These procedures are considered to be reliable and represent International best practice.

Computer modeling performed by Applicant using the BPA 1977 software under the worst case wet conditions scenario indicated that the audible L5 and L50 noise levels (discussed below) measured at the edge of the right-of-way would be at 25.92/26.10 (monopole/h-frame) and 22.42/22.60 (monopole/H-frame) dBA, respectively, well below the MPCA nighttime L50 limit of 50 dBA for Noise Area Classification 1.

These findings are shown in **Table 6**.

Table 6. Predicted Audible Noise from HVTL

Structure Type	Noise L5 (37.5 Feet From Centerline) (Decibels A- weighted)	Noise L50 (37.5 feet From Centerline) (Decibels A-weighted)
115kV Monopole	25.92	22.42
115kV H-Frame	26.10	22.60

Potential Impacts

Noise levels produced by 115 kV transmission lines are usually not audible and have not been demonstrated to approach even the most stringent state standards. Additionally, the majority of the project is located adjacent to roadways, and mining activity; sounds from these sources would overpower any project-related noise emissions. Noise impacts from the project are not anticipated.

Mitigative Measures

The Applicant has stated that in an effort to mitigate noise levels associated with construction activities, work would be limited to daytime hours between 7 a.m. and 10 p.m. on weekdays. Occasionally there may be construction outside of these hours or on a weekend if the company is required to work around customer schedules, line outages, or has been significantly impacted due to other factors. Heavy equipment would also be equipped with sound attenuation devices such as mufflers to minimize the daytime noise levels.

No mitigation measures are required for the operational phase of the line as operational noise levels are not predicted to exceed the state noise limits.

5.5 Radio and Television Interference

Corona on transmission line conductors can generate electromagnetic noise at frequencies at which radio and television signals are transmitted. This noise can cause interference (primarily with AM radio stations and the video portion of TV signals) with the reception of these signals depending on the frequency and strength of the radio and television signal. However, this interference is often due to weak broadcast signals or poor receiving equipment.

The most significant factor with respect to radio and television interference is not the magnitude of the transmission line induced noise, but how the transmission line induced noise compares with the strength of the broadcast signal. Very few radio noise problems have resulted from existing 115 kV transmission lines, as broadcast signal strength within a radio station's primary coverage area is great enough that adequate signal to noise ratios are maintained.

If radio interference from transmission line corona does occur with AM radio stations presently providing good reception, satisfactory reception can be obtained by appropriate modification of (or addition to) the receiving antenna system.

Interference with FM broadcast station reception is generally not a problem because:

- corona generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 megahertz (MHz)), and
- the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel tower) may experience interference because of signal blocking effects. Movement of either mobile unit so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile unit adjacent to a metallic tower. Noise in the frequency range of cellular type phones is almost non-existent and the technology used by these devices is superior to that used in two-way mobile radio.

As in the case with AM radio interference, corona-generated noise could cause interference with TV picture reception because the picture is broadcast as an AM signal. The level of interference depends on the TV signal strength for a particular channel (TV audio is an FM signal that is typically not impacted by transmission line radio frequency noise).

Due to the higher frequencies of the TV broadcast signal (54 MHz and above), 115 kV transmission lines seldom result in reception problems within a station's primary coverage area. In the rare situation that the proposed transmission line would cause TV interference within a broadcast station's primary coverage area where good reception is presently obtained, Xcel Energy has stated that it would work with the affected party to correct the problem. Usually any reception problem can be corrected with the addition of an outside antenna.

Mitigative Measures

No interference issues are anticipated with this project, however, should such interferences be identified, the Applicant would be required to resolve the problem as a condition of the HVTL Route Permit.

5.6 Aesthetics

Construction of the proposed HVTL will occur adjacent to existing road rights-of-way for the majority of its length, as well as within an area already populated by transmission lines, structures, and mining activities. Therefore, the project will have nominal effects on the visual and aesthetic character of the area. The proposed structures for the 115 kV HVTL will be similar to the other 115 kV transmission lines used by Minnesota Power in the area. The structures will be constructed with both monopole and H-Frame direct embedded wood structures. Monopole tangent structures will use wood or laminated wood poles with horizontal post or braced post insulators will range in height from 60 to 105 feet above ground, and the spans adjacent to these structures will range from 250 to 350 feet. H-Frame structures will utilize two braced wood poles and suspension insulators, will range in height from 60 to 70 feet above ground, and the spans adjacent to these structures will range from 500 to 1,000 feet.

Like the existing transmission lines in the area, the new HVTL will be visible to residents along the western edge of Eveleth and users along an existing mining road and County Road 101. The majority of the landscape in the eastern project area is commercial/industrial and in the western Project area is open and scrub-shrub wetland.

The visual impact will depend largely on the perceptions of the observers. The visual contrast added by the transmission structures and lines may be perceived as a visual disruption. The transmission lines that already exist in the project area will limit the extent to which the new lines are viewed as a disruption to the area's scenic integrity. Minnesota Power is also planning to remove the existing transmission line that currently transects United Taconite's north pit northwest of Eveleth. A comment was made during the Minnesota Power public meeting expressing concern regarding the potential visual impact the new structures could have from the Leonidas Scenic Overlook.

One can glimpse the local history of mining from the Leonidas Overlook**,** a mile west of Eveleth on County Rd. 101. From the highest man-made point on the Mesabi Iron Range, built up from stockpiled overburden and lean ore, the panoramic view takes in the surrounding white pine forest, the red-ridged ore pits and the water towers of Eveleth, Virginia and Mountain Iron.

From here, visitors will see former mine sites, as well as the active mine, UTac, in Eveleth. This is the largest man-made point on the Iron Trail. Along with the water towers of several communities, the Laurentian Divide, is visible on the horizon as a low range of hills.

The existing MP 39 line is visible to someone looking to the northeast from the Leonidas Overlook.

The Thunderbird Mine, visible to the north and south, used to be several mines. One of those, the Leonidas Mine, opened in 1908 and was the deepest underground mine in the world at the time, with a depth of more than 650 feet. The mine, closed in 1980, produced nearly 24 million tons of iron ore.

That mine and the overlook are named after Leonidas Merritt, one of seven brothers who discovered the Mesabi Range ore deposits in 1890 and opened the area to commercial development.

Potential Impacts

Although the transmission line would be visible throughout most of its length, it is not incompatible with its setting among existing transmission lines, transportation corridors and mining development along the route.

The new MP 39 line may be less of a visible distraction than the existing MP 39 line due to the elevation of the Leonidas Overlook (~1,530 amsl) and the proximity and elevation of County Rd. 101, along which proposed alignment (~1400 amsl) is located; the proposed transmission line would tend to be below the sight line of someone looking north at the vista.

Mitigative Measures

Minnesota Power has stated that it will work with landowners to identify concerns related to the transmission line aesthetics and will attempt to mitigate (structure placement/location) these concerns, to the greatest extent practicable, while adhering to the route and alignment conditions of the HVTL Route Permit.

5.7 Public Health and Safety Including EMF

The project will be designed to comply with local, state, NESC and Minnesota Power standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and ROW widths. Minnesota Power construction crews and/or contract crews would comply with local, state, NESC and Minnesota Power standards regarding installation of facilities and standard construction practices. Established industry safety procedures would be followed during and after installation of the transmission line. This would include clear signage during all construction activities.

The transmission line must be equipped with protective devices to safeguard the public from the transmission line if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment would de-energize the transmission line, should such an event occur.

Electric and Magnetic Fields

Voltage transmitted through any conductor produces both an electric field and a magnetic field in the area surrounding the wire. The electric field associated with HVTLs extends from the energized conductors to other nearby objects. The magnetic field associated with HVTLs surrounds the conductor. Together, these fields are generally referred to as electromagnetic fields, or EMF. These effects decrease rapidly as the distance from the conductor increases.

Electric Fields

Voltage on any wire (conductor) produces an electric field in the area surrounding the wire. The electric field associated with a high voltage transmission line extends from the energized conductors to other nearby objects such as the ground, towers, vegetation, buildings and vehicles. The electric field from a transmission line gets weaker as one moves away from the transmission line. Nearby trees and building material also greatly reduce the strength of transmission line electric fields.

The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/M). Transmission line electric fields near ground are designated by the difference in voltage between two points (usually 1 meter). **Table 7** provides the electric fields at maximum conductor voltage for the proposed transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

The maximum electric field, measured at one meter above ground, associated with the project is calculated to be 1.37 kV/m (115 kV single circuit).

Table 7. Calculated Electric Fields (kV/m)

Structure Type [a]	Maximum Operating Voltage (kV)	Distance to Proposed Centerline (feet)										
		-300	-200	-100	-50	-25	Max	25	50	100	200	300
115 kV Monopole	121	0.01	0.02	0.07	0.18	0.38	1.32	0.54	0.18	0.08	0.02	0.01
115 kV H-Frame	121	0.00	0.01	0.06	0.37	1.16	1.37	1.16	0.37	0.06	0.01	0.00
[a]												

There is no federal standard for transmission line electric fields. The Commission, however, has imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground. *In the Matter of the Route Permit Application for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, Order Granting Route Permit (*adopting* ALJ Findings of Fact, Conclusions and Recommendation at Finding 194 (April 22, 2010 and amended April 30, 2010)) (September 14, 2010). The standard was designed to prevent serious hazards from shocks when touching large objects parked under AC transmission lines of 500 kV or greater.

Magnetic Fields

Current passing through any conductor, including a wire, produces a magnetic field in the area around the wire. The magnetic field associated with a high voltage transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The magnetic field is expressed in units of magnetic flux density, expressed as milligauss (mG).

Table 8. Calculated Magnetic Flux Density (milligauss)

Structure Type	Line Current (Amps)	Distance to Proposed Centerline (feet)										
		-300	-200	-100	-50	-25	Max	25	50	100	200	300
115 kV Monopole	614	0.60	1.31	4.77	14.90	34.88	77.13	45.40	18.85	5.53	1.42	0.63
115 kV H-Frame	614	0.85	1.90	7.45	27.13	74.73	139.45	74.73	27.13	7.45	1.90	0.85
[a]												

The magnetic field profiles around the proposed HVTL for each structure and conductor configuration being considered for the project is shown in **Table 8**. Magnetic fields were calculated at the conductor's thermal limit based on the design of the HVTL. The peak magnetic field values are calculated at a point directly under the HVTL and where the conductor is closest to the ground. The same method is used to calculate the magnetic field at the edge of the right-of-way. The magnetic field profile data show that magnetic field levels decrease rapidly as the distance from the centerline increases.

Because the actual power flow on a transmission line could potentially vary widely throughout the day depending on electric demand, the actual magnetic field level could also vary widely from hour to hour. In any case, the typical loading of the transmission line will be far below the

thermal limit of the line, resulting in typical magnetic fields well below those indicated in the table.

It can be noted that magnetic fields are not singularly associated with power lines. Every person has exposure to these fields to a greater or lesser extent throughout each day, whether at home or in schools and offices. The following table (**Table 9**) contains field readings for a number of selected, commonly encountered items. These reading represent median readings, meaning one might expect to find an equal number of readings above and below these levels.

Table 9. Magnetic Fields (milligauss) From Common Home and Business Appliances

Type	Distance From Source in Feet			
	0.5	1	2	4
Computer Display	14	5	2	-
Fluorescent Lights	40	6	2	-
Hairdryer	300	1	-	-
Vacuum Cleaners	300	60	10	1
Microwave Oven	200	40	10	2
Conventional Electric Blanket	39.4 peak 21.8 average			
Low EMF Electric Blanket	2.7 peak .09 average			

Source: EMF In Your Environment, EPA 1992

Stray Voltage

Stray voltage encompasses two phenomena: Neutral to Earth Voltage and Induced Voltage. In general, stray voltage describes any case of elevated potential, but more precise terminology gives an indication of the source of the voltage.

Neutral to Earth Voltage (NEV) refers to a condition that can occur at the electric service entrances to structures, that is, where distribution lines enter structures. It is the phenomena most commonly referred to as "stray voltage." NEV is an extraneous voltage that appears on metal surfaces in buildings, barns and other structures, which are grounded to earth. NEV can be experienced, for example, by livestock who simultaneously come into contact with two metal objects (e.g., feeders, waterers, stalls). If there is a voltage between these objects, a small current

will flow through the livestock. The fact that both objects are grounded to the same place (earth) would seem to prevent any voltage from existing between the objects. However, this is not the case – a number of factors determine whether an 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.[14]

Neutral to Earth Voltage can result from damaged, corroded or poorly connected wiring or damaged insulation. Thus, NEV can exist at any business, house or farm which uses electricity, independent of whether there is a transmission line nearby. NEV is largely an issue associated with electrical distribution lines and electrical service at a residence or on a farm. Transmission lines do not create NEV as they do not directly connect to businesses, residences or farms.

NEV can be reduced in three ways: reducing the current flow on the neutral wire entering a home or building, reducing the resistance of the neutral system, or improving the grounding of the neutral system. Making good electrical connections and making sure that these connections have the proper wiring materials for wet and corrosive locations will reduce the resistance of grounded neutral system and thereby reduce NEV levels.

Induced Voltage refers to situations where an electric field extends to a nearby conductive object, thereby "inducing" a voltage on the object. The electric field from a transmission line in some instances can reach a nearby conductive object, such as a vehicle or a metal fence, which is in close proximity to the transmission line. This may induce a voltage on the object, which is dependent on many factors, including the weather conditions, object shape, size, orientation, capacitance and location along the right-of-way. If these objects are insulated or semi-insulated from the 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 major concern with induced voltage is the current that flows through a person to the ground when touching the object, not the level of the induced 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. In addition, the Commission's electric field limit of 8 kV/m was designed to prevent serious hazard from shocks due to induced voltage under high-voltage transmission lines. Proper grounding of metal objects under and adjacent to the transmission line is the best method of avoiding these shocks.

While transmission lines do not, by themselves, create NEV because they do not connect to businesses or residences, they can induce voltage on a distribution circuit that is parallel and immediately under the transmission line. This induced voltage only occurs in the immediate

[14] Stray Voltage, NDSU Extension Publication #108, http://www.ag.ndsu.edu/extension-aben/epq/files/epq108.pdf.

vicinity of the distribution circuit; it does not travel along the transmission or distribution line. Standard industrial designs can mitigate potential for stray voltage to impact distribution lines.

Induced voltage can be reduced or eliminated using cancellation, separation or enhanced grounding. Cancellation can be achieved by configuring the conductors of the transmission line to minimize EMF levels. Separation literally increases the distance between the transmission and distribution lines by physically placing the lines in different locations or by increasing the vertical distance between transmission and distribution lines collocated on the same poles. Enhanced grounding connects counterpoises to the distribution neutral wire and the transmission shield wire.

Potential Impacts

Electric and Magnetic Fields

There are no federal or Minnesota state regulations for the permitted strength of a magnetic field on a transmission line; however both Florida and New York have standards ranging from 150 to 250 mG. **Table 10** summarizes the international and state guidelines for ELF and EMF that current exist.

Table 10. ELF EMF International and State Guidelines

ELF-EMF Guidelines Established by Health & Safety Organizations		
Organization		**Magnetic Field**
American Conference of Governmental and Industrial Hygienists (ACGIH) (Occupational)		10,000 mG (for general worker) 1,000 mG (for workers with cardiac pacemakers)
International Commission on Non-Ionizing Radiation Protection (ICNIRP) (General Public, Continuous Exposure)		833 mG
Non-Ionizing Radiation Committee of the American Industrial Hygiene Association		4,170 mG
Institute of Electrical and Electronics Engineers (IEEE) Standard C95.6 (General Public, Continuous Exposure)		9,040 mG
U.K., National Radiological Protection Board (NRPB)		833 mG
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)		3,000 mG
State Standards and Guidelines		
State	**Line Voltage**	**Magnetic Field (Edge of ROW)**
Florida	69-230 kV	150 mG
	230-500 kV	200 mG
	>500 mG	250 mG
Massachusetts		85 mG
New York		200 mG

Source: EPRI, 2003; Union of the Electric Industry – EUROELECTRIC, 2003.

The effect of EMF on human health has been the subject of study for over 25 years. Of particular concern is the link between EMF exposure and cancer. Numerous panels of experts

have convened to review research data on whether EMF is associated with adverse health effects. The studies have been conducted by the National Institute of Environmental Health Sciences (NIEHS), the USEPA, the World Health Organization (WHO), and the Minnesota State Interagency Working Group (MSIWG) on EMF issues. Studies regarding EMF exposure and childhood leukemia and other cancer risks have had mixed results. Some organizations have determined that a link between EMF and cancer exists while others have found this link to be weak or nonexistent.

In 1992, Congress initiated U.S. EMF Research and Public Information Dissemination (EMF RAPID). EMF RAPID program studied whether exposure to electric and magnetic fields produced by the generation, transmission, or use of electric power posed a risk to human health. Program conclusions were presented to Congress on May 4, 1999 as follows:

- The scientific evidence suggesting that EMF-EMF exposures pose any health risk is weak.
- Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status. The lack of consistent positive findings in animals or mechanistic studies weakens the belief that this association is actually due to ELF-EMFs, but it cannot completely discount the epidemiological findings.
- The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the Unite States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern (NIEHS, 1999).

In October 1996, a National Research Council Committee of the National Academy of Sciences released a report which corroborated the findings of EMF RAPID. The report concluded:

> *Based on comprehensive evaluation of published studies relating to the effects of power-frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard.*

Currently the USEPA states the following viewpoint of the associated health effects of EMF on its website (USEPA: Electric and Magnetic Fields (EMF) Radiation form Power Lines, 2009):

> *Much of the research about power lines and potential health effects is inconclusive. Despite more than two decades of research to determine whether elevated EMF exposure, principally due to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence available is weak and is not sufficient to establish a definitive cause-effect relationship (USEPA, 2009).*

In 2001, the World Health Organization (WHO) International Agency for Research on Cancer classified power-frequency EMF as a "possible carcinogenic to humans." Currently the WHO states the following viewpoint of the associated health effects of EMF on its website (WHO, 2009):

> *Extensive research has been conducted into possible health effects of exposure to many parts of the frequency spectrum. All reviews conducted so far have indicated that exposures below the limits recommended in the INNIRP (1998) EMF guidelines, covering the full frequency range from 0-300 GHz, do not produce any known adverse health effect. However, there are gaps in knowledge still needing to be filled before better health risk assessments can be made (WHO, 2009).*

In September of 2002, the MSIWG on EMF Issues, published "A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options," referred to as the "White Paper." The MSIWG was formed to examine the potential health impacts of EMFs and to provide useful, science-based information to policy makers in Minnesota. Work Group members included representatives from the Department of Commerce, the Department of Health, the Pollution Control Agency, the Public Utilities Commission, and the Environmental Quality Board (MSIWG, 2002). The White Paper concluded the following findings:

- Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF (see the conclusion of IARC and NIEHS). However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship (see NTP, 1999; Takebe et al., 2001), nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.
- The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed. Construction of new generation and transmission facilities to meet increasing electrical needs in the State is likely to increase exposure to EMF and public concern regarding potential adverse health effects.

- Based upon its review, the Work Group believes the most appropriate public health policy is to take a prudent avoidance approach to regulating EMF. Based upon this approach, policy recommendations of the Work Group include:

    - Apply low-cost EMF mitigation options in electric infrastructure construction projects;
    - Encourage conservation;
    - Encourage distributed generation;
    - Continue to monitor EMF research;
    - Encourage utilities to work with customers on household EMF issues; and
    - Provide public education on EMF issues (MSIWG, 2002).

As noted above, research has not been able to establish a cause and effect relationship between exposure to EMFs and adverse health effects. However, a general consensus has been formed to continue research on the health effects of EMFs. At this time, there are no federal standards in the United States to limit EMF exposure.

Continued Research

It is important to note that although expert panels and agencies, such as the ones discussed above, have not yet identified any viable cause and effect relationships between exposure to EMFs and adverse health effects, hypotheses have existed and continue to be researched.

For example, Dr. David O. Carpenter during the recent public hearing proceedings for the proposed 345 kV transmission line from Brookings County, South Dakota, to Hampton, Minnesota, provided pre-filed direct testimony regarding his findings on health effects associated with EMF. Dr. Carpenter is a public health physician and Director of the Institute for Health and the Environment at the University of Albany, SUNY. He researched and wrote a document titled, *Setting Prudent Public Health Policy for Electromagnetic Field Exposures*. Carpenter concludes "there is strong scientific evidence that exposure to magnetic fields from power lines greater than 4 milligauss (mG) is associated with an elevated risk of childhood leukemia" and that some studies have indicated that there is scientific evidence to suggest that exposures above 2 mG could increase leukemia risks. Carpenter goes on to suggest that "lifetime exposure to magnetic fields in excess of 2 mG is associated with an increased risk of neurodegenerative diseases in adults, including Alzheimer's disease and amyotrophic lateral sclerosis (ALS)." Additionally, during his recent testimony on the proposed 345 kV HVTL in response to whether EMF similar to power line exposure can affect biological tissue, he states the following:

> *Any one of these actions [actions that alter cell tissue] might be responsible for the carcinogenic and/or neurodegenerative actions of EMFs. As with many environmental agents, however, assuming that only one mechanism of action exists would be a mistake, particularly where more than one disease is involved. It is more likely that multiple mechanisms of action would contribute to disease.*

EMF as it relates to public health and safety continues to be researched and reviewed.

Stray Voltage

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, it was found that the electric distribution system directly serving the farm or the facilities themselves were directly under and parallel to the transmission line. These circumstances are considered in modern day routing/installing of transmission lines and can be readily avoided.

Mitigative Measures

As per the MDH White Paper recommendations concerning "prudent avoidance," utilities routinely use structure designs that minimize magnetic field levels and, where practicable, site facilities in locations affecting the fewest number of people.

5.8 Recreation

No known federal, state, or county parks, forests, recreational areas, wildlife refuges, wildlife protection areas, trails, or natural areas will be affected by the project. The City of Eveleth offers several recreational opportunities and public infrastructure; the project is located to the west of the city and would not affect these facilities. The general area supports recreational activities such as hiking, snowmobiling, biking, hunting, and fishing.

Potential Impacts

Direct impacts on existing recreational opportunities and public services within the project location will be avoided because the proposed route will not cross these areas and it is collocated with existing road rights-of-way for the majority of the route.

The project is not anticipated to result in adverse or significant impacts on recreation.

Mitigative Measures

Since impacts to recreation are not anticipated, no mitigation is required.

5.9 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 MP 39 Line Relocation project are, in general, anticipated to be minimal. There are no agricultural or forestry operations in the project area. Based on recent aerial photographs, the nearest significant tracts of land with evidence of agriculture are located approximately 0.5 mile west of the western-most portion of the project. The route does not impact any managed forests or nurseries. No privately-owned forest production industry would be affected by the project.

Impacts to United Taconite mining operations are anticipated to be positive, as the project will remove the existing 115 kV lines from the mine area and allow for the expansion of these activities. As previously mentioned, the project area is bounded by the Mesabi Iron Range, a vast deposit of iron ore and the largest of three major iron ranges in Minnesota. Mining activities play a significant role in the area's economy, accounting for 10 percent of the area's industry (compared to less than 1 percent statewide). The project will remove the existing transmission line that crosses an active taconite mine, thereby providing United Taconite with additional space to conduct mining operations and be consistent with future plans for the mining property.

The new HVTL will be located south and west of the mine and the proposed route has been selected in consultation with United Taconite.

Impacts to land-based economies can be minimized by prudent routing, i.e., by choosing routes and alignments that avoid such economies. Impacts can be mitigated by the use of designs and structures which are, to the extent possible, compatible with land-based economies.

5.10 Commercial, Industrial, Residential Land Use

The proposed route will cross areas classified by the cities of Eveleth and Mountain Iron as zoned for mining and rural residential purposes.
Based on a review of recent aerial photography conducted by the Applicant, there are 23 residences within 300 feet of the proposed alignment, of which one is within 100 feet of the proposed alignment. Also, there are 13 commercial buildings within 300 feet of the proposed alignment, of which 2 are within 100 feet.

The numbers of structures located within various distances from the project are shown in **Table 11**.

Table 11. Distance to Structures

Structure	Distance [a]					
	0 to 50 feet	51 to 100 feet	101 to 150 feet	151 to 200 feet	201 to 250 feet	251 to 300 feet
Residences	0	1	2	6	12	23
Commercial	0	2	2	4	10	13

[a] Distance is from proposed alignment within the proposed 500-foot-wide route.

Potential Impacts

The Applicant's proposed route minimizes new impacts to existing land uses as it is within or adjacent to County Road 101 and an existing haul road right-of-way for approximately 52 percent of the length of the route. The project will require approximately 3.0 miles of new right-of-way. The Applicant will need to acquire easement rights across certain parcels to accommodate the facilities for the HVTL right-of-way if a route permit is granted.

An easement is an interest in land purchased by a utility, which permits the use of that land for a specific purpose. In this case, Minnesota Power's easement would permit construction, operation and maintenance of an overhead transmission power line. The easement also permits the trimming and removal of trees within the easement to prevent them from touching the line.

The existence of a transmission line easement restricts some possible uses for the property. Acceptable uses within the easement areas include planting crops, pasture, roadways, curbs and gutters. The two most common restrictions would include prohibiting construction of permanent structures or buildings within the easement area and restrictions on planting trees that may grow into the lines; properties with existing structures very close to or within the ROW may have further restrictions placed on them.

The project would be design to meet or exceed the clearance standards provided in NESC Section 232 for a 115 kV transmission line, which require a 9' 1'' horizontal distance between the conductor and a building; a 15' 1'' vertical distance between the conductor and a roof/balcony accessible by people; and a 20' 1'' vertical distance between the conductor and a roadway or parking lot.

Another concern associated with transmission lines includes potential effects on the availability of federal assistance mortgage loan insured by the Federal Housing Administration (FHA) as well as the availability of the Housing and Urban Development (HUD) backed mortgages for development of high density residential and/or mixed use developments. See *Section 5.2 Socioeconomics*, for a detailed discussion on this matter.

Mitigative Measures

Measures to minimize impacts to existing land uses would be developed through final design; such measures may include placing the conductors on a single side of the support towers, adjustments in final alignment within the proposed route, ROW sharing/overlap with existing infrastructure, and selection of span width and tower placement. Such measures may be specified as a condition of the HVTL Route Permit.

The Applicant stated in the application that it would work with county, city staff and business and residential property owners to ensure that impacts to land use from the construction of the line are minimized and addressed.

5.11 Public Services and Transportation

Minnesota Power will implement proper safeguards during construction and operation to avoid potential impacts public health and safety. The project will be designed in compliance with local, state, NESC, and Minnesota Power standards for clearance to ground, crossing utilities and buildings, strength of materials, and right-of-way widths.

The Applicant will be responsible for ensuring that construction and contract crews comply with local, state, NESC, and company standards for installation of facilities and standard construction practices. Minnesota Power established and industry safety procedures will also be followed after the transmission line is installed. This will include clear signage during all construction activities.

The proposed HVTL will be equipped with protective devices (circuit breakers and relays located in the substation where the transmission lines terminate) to safeguard the public if an accident occurs, such as a structure or conductor falling to the ground. The protective equipment will de-energize the transmission line should such an event occur. Minnesota Power will post signage to warn the public about the risk of coming into contact with the energized equipment.

The Applicant has stated that it will work within the Minnesota Department of Transportation's (DOT) accommodation policy to position and manage the right-of-way along roadways. MnDOT has adopted a formal policy and procedures for accommodation of utilities on the highway rights-of-way (Utility Accommodation Policy). A copy of MnDOT's policy can be found at:

http://www.dot.state.mn.us/utiIity/files/pdflappendix·b.pdf

Potential Impacts

With implementation of safeguards and protective measures, the project is not anticipated to result in adverse or significant impacts on public health and safety.

Mitigative Measures

Minimal to no impacts to public services are anticipated to occur as a result of the proposed project; aside from the standard practices stated above no mitigative measures are required.

5.12 Archaeological and Historic Resources

During Minnesota Power's pre-planning phase, the Minnesota State Historic Preservation Office (SHPO) was contacted by the Applicant's representative and a Phase 1a cultural resource assessment was conducted.[15]

[15] RPA, Appendix E

A search of the SHPO database was conducted in order to identify previously-documented sites within one mile of the project. A radius of one mile was used in order to determine the types of archaeological and historic resources, both identified and unidentified, that are likely to be found in the area that could be affected by the project.[16]

The cultural resources assessment revealed that no archaeological site or inventoried standing structure is recorded within the Area of Potential Effects (i.e., the 500-foot wide route and the 100-foot wide anticipated ROW); however, the review did identify 29 inventoried historic architectural properties located within 1 mile of the project (**Table 12, Figure 10**).

No archaeological sites were identified within 1 mile of the project.

Five of the historic architectural properties are listed on the National Register of Historic Places (NRHP). The listed properties include a single family house and four public buildings. The period of significance for these properties dates from 1900 to 1924. Each property has direct ties to the mining industry including the residence of W. Bailey, manager of the mining-rights fee office, a church, vocational school and gym built for workers in the iron mining industry, and one of the region's leading hotels built on a major stop on Mesaba Railway's interurban trolley line.

The historic character of these five properties will not be affected by the proposed project.
None of the remaining 24 recorded historic structures are within the Area of Potential Effect (APE). Three of these are considered eligible to the NRHP and include the Eveleth City Hall, Public Library, and the Italian American Social Club. Another two buildings and two bridges have been determined not eligible for the NRHP. The remaining 17 structures have not been assessed for their eligibility for listing on the NRHP.

Table 12. Previously Identified Archaeological/Historical Properties

Inventory Number	Property Name	City/ Township	NRHP Status
SL-EVC-001	Eveleth High School	Eveleth	Not assessed
SL-EVC-002	houses	Eveleth	Not assessed
SL-EVC-003	houses	Eveleth	Not assessed
SL-EVC-004	houses	Eveleth	Not assessed
SL-EVC-005	commercial building	Eveleth	Not assessed
SL-EVC-006	commercial building	Eveleth	Not assessed
SL-EVC-007	commercial buildings	Eveleth	Not assessed
SL-EVC-008	Eveleth City Hall	Eveleth	Considered eligible
SL-EVC-009	commercial buildings	Eveleth	Not assessed
SL-EVC-010	commercial buildings	Eveleth	Not assessed
SL-EVC-011	Miners National Bank	Eveleth	Not assessed
SL-EVC-012	commercial buildings	Eveleth	Not assessed
SL-EVC-013	Eveleth Public Library	Eveleth	Considered eligible
SL-EVC-014	Eveleth Post Office	Eveleth	Not assessed
SL-EVC-015	auditorium	Eveleth	Not assessed

[16] RPA, Appendix E

Inventory Number	Property Name	City/ Township	NRHP Status
SL-EVC-016	fire station	Eveleth	Not assessed
SL-EVC-017	Italian American Social Club	Eveleth	Considered eligible
SL-EVC-018	W. Bailey House (Redstone)	Eveleth	Listed
SL-EVC-019	Church of the Holy Family (Catholic)	Eveleth	Listed
SL-EVC-020	Eveleth Manual Training School	Eveleth	Listed
SL-EVC-021	Eveleth Recreation Building	Eveleth	Listed
SL-EVC-022	Hotel Glode	Eveleth	Listed
SL-EVC-023	John T. Bernard House	Eveleth	Not assessed
SL-EVC-024	Slovenian Meeting Hall	Eveleth	Not eligible
SL-EVC-025	Uranian Hall	Eveleth	Not eligible
SL-EVC-026	Eveleth Hippodrome	Eveleth	Not assessed
SL-EVC-027	Bridge No. L8537	Eveleth	Not eligible
SL-FAY-003	Bridge No. 5697	Fayal Twp.	Not assessed
SL-MIC-010	Bridge No. 7759	Mountain Iron	Not eligible

Potential Impacts

None of the recorded properties are located within the APE, the closest building is the Eveleth Hippodrome (SL-EVC-26). Located within 600 feet of the area of potential effect, it is unlikely that its historic character or its landscape and surroundings will be affected by construction of the transmission line, especially since the view shed is partially obstructed by a separate building and the project area has been heavily modified by mining operations.

The potential to impact any undiscovered archaeological site is low to very low because the project is proposed to be located along existing transportation corridors, in areas already disturbed by mining operations, or in wetlands. Also there are no high potential locations for discovery of prehistoric archaeological sites, such as lakes, or perennial rivers or streams in the proposed project location. Similarly, the potential for unknown historic architectural resources to be affected by the proposed construction of the transmission line is low because the historic landscape and surroundings have been compromised due to the dynamic changes to the mine pit and its supporting infrastructure.

Mitigative Measures

Avoidance of archaeological and historic architectural properties is the preferred mitigative policy for construction of infrastructure projects.

There may be impacts to unidentified archaeological properties in previously undisturbed portions of the project. As a standard HVTL Route Permit condition, Minnesota Power would be required to work with SHPO during their review process to determine what areas may require surveys for the project. The Applicant would carry out the appropriate field identification or construction monitoring.

There are no anticipated impacts to previously identified historic properties, and it is likely that physical impacts to any additional properties identified during corridor survey can be avoided.

Visual impacts to identified and unidentified historic architectural properties are not anticipated.

5.13 Natural Environment

The consideration of the impacts of a transmission line project on natural environment, including air quality, water resources, and flora and fauna are required as part of the environmental review. The impacts of high voltage transmission projects on the natural environment are a function of the spatial alignment of the grid, the structures and conductors required for various voltages, the extent to which pre-existing corridors are used, and how the transmission line is operated and maintained. The range of potential impacts and their significance depend on the area and the design and construction of individual lines.

Air Quality

There are minimal air quality impacts associated with transmission line construction and operation. The only potential air emissions from a transmission line result from corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. For 115/115 kV double-circuit, 115 kV single-circuit and 161 kV single-circuit transmission lines, the conductor gradient surface is usually below the air breakdown level.

Calculations done for a 345 kV project showed that the maximum one hour concentration during foul weather (worst case) would be 0.0007 parts per million (ppm) ozone. This is well below both the federal (0.075 ppm 8 hour) and state standards (0.08 ppm 8 hour) for ozone.

The Henshaw Effect is a theory that fine particulates already present in the air surrounding HVTLs may become ionized from HVTL corona. Ionization of the particulate matter (PM) is believed by Dr. Denis Henshaw, HH Wills Physics Laboratory, University of Bristol, United Kingdom, to increase the deposition of the fine particulates within the lungs. Fine particulates may be comprised of polycyclic aromatic hydrocarbons. The increased deposition may lead to increased lung disease and cancer rates.[17]

Temporary fugitive dust emissions from construction activities may occur. Along the proposed route, clearing vegetation and driving the utility poles may create exposed areas susceptible to wind erosion. In addition, tailpipe emissions may generate exhaust from the construction vehicles.

Fugitive dust is considered particulate matter under air quality regulations. The concentrations of fugitive dust that is fine particulate matter (PM less than 2.5 microns or PM2.5) is generally small, or approximately three percent to ten percent of total particulate matter (USEPA's AP-42, Sections 13.2 and 11.9). Since fine particulate matter has the potential to travel further into the lungs, it is of greater concern than larger particle size ranges.

[17] Corona ions from powerlines and increased exposure to pollutant aerosols A P Fews, D L Henshaw, R J Wilding and P A Keitch, . International Journal of Radiation Biology, Vol. 75. No. 12, 1523 - 1531, 1999.

Potential Impacts

Currently, both state and federal governments have regulations regarding permissible concentrations of ozone and oxides of nitrogen. The national standard is 0.08 ppm on an eight-hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year. Calculations using the Bonneville Power Administration (BPA) Corona and Field Effects Program Version 3 (US Department of Energy, BPA Undated) for a standard single-circuit 161 kV project, predicted the maximum concentration of 0.007 ppm near the conductor and 0.0003 ppm at one meter above ground during foul weather or worst-case conditions (rain at 4 inches per hour). During a mist rain (rain at 0.01 inch per hour), the maximum concentrations decreased to 0.0003 ppm near the conductor and 0.0001 ppm at one meter above ground level. For both cases, these calculations of ozone levels are well below the federal and state standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there would be no impacts relating to ozone for the project.

There would be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing during construction of the transmission line and substation. Temporary air quality impacts caused by the construction-related emissions are expected to occur during this phase of activity. The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment would vary according to the phase of construction but would be minimal and temporary. Adverse impacts to the surrounding environment would be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

The National Radiological Protection Board (NRPB) has a statutory responsibility for advising the governmental departments of the United Kingdom on standards of protection for exposure to electric and magnetic fields and radiations in the natural and working environments. The NRPB established an advisory group to review work on biological effects of non-ionizing radiation relevant to human health and to advise on research priorities. The advisory group reviewed the possible effects of corona ions or electric fields on intakes of radioactive particles or other airborne pollutants and made recommendations of future research.[18]

The advisory group concluded that the potential impact of corona ions on health (Henshaw Effect) would depend on the extent to which they increase the dose of relevant pollutants to target tissues in the body and that it was not possible to estimate the impact precisely because of uncertainties involving the extent to which corona increase the charge on particles, the exact impact of charging on particle deposition in the respiratory system, and dose-response health outcomes.[19]

[18] Particle Deposition in the Vicinity of Power Lines and Possible Effects on Health, National Radiological Protection Board, vol 15, No. 1, 2004. Oxfordshire, UK. (http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1194947415038)
[19] Ibid

Further, the study continues, that it seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most vulnerable. In public health terms, the proportionate impact would be even lower because only a small fraction of the general population live or work close to sources of corona ions.[20]

The advisory group's recommendations were that the possible implications for health of the mechanisms associated with this issue did not provide a strong case for further research in this area.[21]

Mitigative Measures

As a standard HVTL Permit condition, construction activities must follow best management practices (BMPs) to control air emissions (fugitive dust). Petroleum based dust suppressants may not be used. Construction vehicles with excess tailpipe emissions would not be operated until repairs to the vehicle could be made. The disturbed area for each route would be minimized.

There would be no significant impacts to air quality; therefore, no mitigation beyond BMPs would be necessary.

Water Quality - Surface Water and Wetlands

The project is located within the Great Lakes Basin and the St. Louis River and Vermillion River watersheds. Hydrologic features along the proposed route include two water bodies and several wetland areas (**Figure 11**). There are also several water filled mines pits located to the north and south of the proposed route.

Public waters are wetlands, water basins and watercourses of significant recreational or natural resource value in Minnesota, as defined in Minnesota Statutes Section 103G.005; the DNR has regulatory jurisdiction over these waters. The two water bodies within the proposed route include a drainage ditch and Elbow Creek, both are classified as Public Waters Inventory (PWI) water bodies.

The MnDNR PWI identifies lakes, wetlands, and watercourses over which the MnDNR has regulatory jurisdiction. Minnesota law (Minnesota Statutes Section 84.415 administered through Minnesota Rules Chapter 6135) requires that a license be obtained from the MnDNR Division of Lands & Minerals for the passage of any utility over, under, or across any state land or public waters.

Wetlands are important resources for flood abatement, wildlife habitat, and water quality. Wetlands that are hydrologically connected to the nation's navigable rivers are protected

[20] Particle Deposition in the Vicinity of Power Lines and Possible Effects on Health, National Radiological Protection Board, vol 15, No. 1, 2004. Oxfordshire, UK. (http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1194947415038)
[21] Ibid

federally under Section 404 of the Clean Water Act. In Minnesota, wetlands are also protected under the Wetland Conservation Act. The USFWS produced maps of wetlands based on aerial photographs and Natural Resources Conservation Service soil surveys starting in the 1970s; these wetlands are known as the National Wetland Inventory (NWI).

Wetlands that were identified through the NWI system as being located within the requested route width are listed in **Table 13** and shown in Figure 11. Minnesota Power contracted for wetland surveys of the proposed route, which were conducted in early September 2012. Based on the wetland surveys, the proposed HVTL route will cross a total of 0.7 mile of wetland. The project area is dominated by Palustrine Scrub Shrub (PSS), Palustrine Emergent (PEM), and Palustrine Forested (PFO) classified wetlands.

Table 13. Wetlands Identified within the Proposed Route

Wetland Type [a]	500-ft-wide Route Width [b]	100-ft-wide Easement Width [b]
PSS	30.0	5.7
PFO	5.7	1.1
PEM	7.7	1.8
PUB	1.6	0.0
Total	**45.0**	**8.6**

[a] Based on the FWS' Cowardin Classification System for wetlands. Wetland types include: PSS – Palustrine Shrub-Scrub, PFO - Palustrine Forested, PEM – Palustrine Emergent, and PUB – Palustrine Unconsolidated Bottom.
[b] Wetland acreages based on wetland surveys conducted in the summer of 2012.

Wetlands within the Palustrine System classification include all nontidal wetlands dominated by trees, shrubs, emergents, mosses, or lichens.[22]

The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes.

The Scrub-Shrub Wetlands may represent a successional stage leading to Forested Wetland, or they may be relatively stable communities. They occur only in the Estuarine and Palustrine Systems, but are one of the most widespread classes in the United States.[23]

Forested Wetlands are most common in the eastern United States and in those sections of the West where moisture is relatively abundant, particularly along rivers and in the mountains. They occur only in the Palustrine and Estuarine Systems and normally possess an overstory of trees, an understory of young trees or shrubs, and a herbaceous layer. These names often occur in combination with species names or plant associations such as cedar swamp or bottomland hardwoods.

[22] Classification of Wetlands and Deepwater Habitats of the United States, Cowardin, Carter, Golet, December 1979. US Department of the Interior, FWS/OBS-79/31.
[23] Ibid.

The Emergent Wetland Class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed. In areas with relatively stable climatic conditions, Emergent Wetlands maintain the same appearance year after year. In other areas, such as the prairies of the central United States, violent climatic fluctuations cause them to revert to an open water phase in some years. Emergent Wetlands are found throughout the United States and occur in all Systems except the Marine. Emergent Wetlands are known by many names, including marsh, meadow, fen, prairie pothole, and slough. Areas that are dominated by pioneer plants which become established during periods of low water are not Emergent Wetlands and should be classified as Vegetated Unconsolidated Shores or Vegetated Streambeds.

The project is located outside of any designated floodplain.

Potential Impacts

During construction, there is the possibility of sediment reaching surface waters and wetlands as the ground is disturbed by excavation, grading and construction traffic. As a standard HVTL Permit condition, the Applicant would be required to employ erosion control best management practices (BMPs); as well as, adherence to the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) permits and Stormwater Pollution Prevention Plan (SWPPP).

Clearing forested wetlands can expose the wetland to invasive and shrubby plants, thus removing habitat for species in the forest interior.
After construction, maintenance and operation activities for the transmission line facilities are not expected to have an adverse impact on surface water quality.

The wetlands crossed by the proposed route are subject to jurisdiction of the US Army Corp of Engineers (USCOE) under Section 404 of the Clean Water Act and current guidance regarding the jurisdictional status of isolated wetlands. Once the route is finalized and permitting requirements determined, Minnesota Power will submit the Minnesota Local/State/Federal Application Form (Joint Application Form) for water/wetland projects to the USCOE's Two Harbors District, MnDNR, and St. Louis County. Application materials will include information necessary for the USCOE to make its jurisdictional determination for impacted wetlands. Minnesota Power anticipates the project will be authorized under the USCOE's RGP-003-MN or LOP-05-MN permitting program.

According to the Clean Water Act, Section 401 water quality certification is required for activities that may result in a discharge to waters of the United States. On non-tribal lands in Minnesota, the MPCA administers Section 401 water quality certification. If the USCOE authorizes the project under its GP/LOP permitting program as expected, the MPCA waives its Section 401 Water Quality Certification authority.

No impacts to groundwater in the project area are anticipated.

Mitigative Measures

BMPs include maintaining sound water and soil conservation practices during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion. Practices can include containing excavated material, protecting exposed soil and stabilizing restored soil. Minnesota Power, through adherence to BMPs, would avoid major disturbance of individual wetlands and drainage systems during construction. This would be done by spanning wetlands and drainage systems where possible. When it is not possible to span the wetland, Minnesota Power will draw on several options during construction to minimize impacts:

- When possible, construction would be scheduled during frozen ground conditions.
- Crews would attempt to access the wetland with the least amount of physical impact to the wetland (e.g., shortest route).
- The structures would be assembled on upland areas before they are brought to the site for installation.
- When construction during winter is not possible, plastic mats would be used where wetlands would be impacted.

The transmission line rebuild may require waters and wetlands permits, letters of no jurisdiction, or exemptions from the USCOE, MnDNR Division of Waters, and St. Louis County. Wetland and surface water impacts, through adherence to BMPs, will be avoided and minimized to the extent practicable. After coordination and application submission, authorization from the USCOE would likely fall under a Letter of Permission (LOP-05-MN) or the utility line discharge provision of a Regional General Permit (RGP-3-MN).

The MnDNR Division of Waters requires a Public Waters Work Permit for any alteration of the course, current, or cross-section below the ordinary high water level of a Public Water or Watercourse. No such alterations are anticipated.

Flora

The project is located within the Laurentian Mixed Forest Province, which, in Minnesota, is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

St. Louis County is comprised primarily (over 50 percent) of forest land; the remaining land uses include approximately 23 percent bog/marsh/fen, 9 percent surface water, 0.7 percent urban/industrial, and less than 0.1 percent cultivated (St. Louis County Comprehensive Water Management Plan). Based on U.S. Geological Survey Land Use, Land Class data (2012) specific to the project, the proposed corridor will cross primarily deciduous forest, barren, and

shrub/scrub and woody wetland land. Common tree and plant species in central St. Louis County include, but is not limited to, various species of firs, pines, maples, birch, willow, basswood, ash, juneberry, sedge, honeysuckle, pondweed, goldenrod, aster, and rush.

Potential Impacts

A transmission line ROW can fragment a larger forest block into smaller tracts. Fragmentation makes interior forest species more vulnerable to predators, parasites, competition from edge species, and catastrophic events. The continued fragmentation of a forest can cause a permanent reduction in species diversity and suitable habitat. This loss of forested habitat increases the number of common (edge) plants and animals that can encroach into what were the forest interiors. This encroachment can have impacts on the number, health, and survival of interior forest species, including some of which may be rare. Examples of edge species that can encroach into forest interiors via transmission ROWs include raccoons, cowbirds, crows, deer, and box elder trees. Interior forest species include songbirds, wolves, and hemlock trees.

The opening of the forest floor to sunlight through tree clearing of the ROW can further encourage these aggressive, invasive species to proliferate. Their spread can alter the ecology of a forest as they out-compete native species for sunlight and nutrients, further reducing suitable habitat and food sources for local wildlife.

Construction vehicles may inadvertently bring into forest interiors invasive and/or non-native plant species. Transmission line construction causes disturbance of ROW soils and vegetation through the movement of people and vehicles along the ROW, access roads, and laydown areas. These activities can contribute to the spread of invasive species. Parts of plants, seeds, and root stocks can contaminate construction equipment and essentially “seed” invasive species wherever the vehicle travels. Invasive species’ infestations can also occur during periodic transmission ROW maintenance activities especially if these activities include mowing and clearing of vegetation. Once introduced, invasive species will likely spread and impact adjacent properties with the appropriate habitat.

Examples of problematic invasive species are buckthorn, honeysuckle, and garlic mustard. Invasive species, once introduced, have few local natural controls on their reproduction and easily spread.

Permanent impacts are anticipated to be minor since the transmission line, as proposed, would be constructed adjacent to road ROWs for approximately 52 percent of its length. Temporary impacts may occur due to activities associated with pole construction, including minor vegetative clearing for excavation, leveling and heavy equipment traffic. Vegetative clearing would include felling trees along the proposed ROW and temporarily trimming or removing any shrubs or tall grass.

Mitigative Measures

BMPs for control of invasive species include marking and avoidance of invasives, timing construction activities during periods that would minimize their spread, proper cleaning of equipment and proper disposal of woody material removed from the ROW.

Because construction measures may not be completely effective in controlling the introduction and spread of invasives, post-construction activities are required. Sensitive areas such as wetlands and high quality forests and prairies should be surveyed for invasive species following restoration of the construction site. If new infestations are discovered, then measures should be taken to control the infestation. Each exotic or invasive species requires its own protocol for control or elimination.

Techniques to control exotic/invasive species include the use of pesticides, biological agents, hand pulling, controlled burning, and cutting or mowing. The HVTL Route Permit could include, as a standard condition and deliverable, the development of an invasive species control plan; the Applicant would be required to consult the DNR to determine the best methods for control of invasive species.

To minimize forest fragmentation, ROWs that avoid major forest blocks should be selected to the extent practicable.

Fauna

The grasslands, wetlands, and woodlands in the area provide habitat for a variety of wildlife. Wildlife and other organisms that inhabit the project area include small mammals such as mice, voles, and ground squirrels; large mammals such as white-tailed deer; waterfowl and other water birds like pelicans and egrets, songbirds, raptors, upland game birds; and reptiles/amphibians such as frogs, salamanders, snakes, and turtles.

Potential Impacts

Wildlife that resides within the construction zone will be temporarily displaced to adjacent habitats during the construction process. It is anticipated that fish and mollusks that inhabit the local watercourses will not be affected by transmission line rebuild or new lines.

Because much of the route/alignment is located within and adjacent to a developed and commercial/industrial area, the fauna generally present within the area are adapted to high levels of anthropogenic disturbance. Therefore, it is unlikely that the construction, operation, and maintenance of the project would have a permanent effect on fauna present in the area. Wildlife that inhabits trees that may be removed for the HVTL will likely be displaced. Comparable habitat is near the route, and it is likely that these organisms would only be displaced a short distance. The majority of construction will be limited to upland areas and, therefore, it is anticipated that any potential impacts on fish and mollusks that inhabit the local waterbodies will

be limited to the removal phase of the existing line (i.e., de-construction) where there would be short term disturbance.

Birds have the potential to collide with all elevated structures, including power lines. Avian collisions with transmission lines can occur in proximity to agricultural fields that serve as feeding areas, wetlands and water features, and along riparian corridors that may be used during migration.

The electrocution of large birds, such as raptors, is more commonly associated with small distribution lines than large transmission lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Utility transmission and distribution line design standards provide adequate spacing to eliminate the risk of raptor electrocution and will minimize potential avian impacts of the proposed project.

Plastic erosion control netting is frequently used for erosion control during construction and landscape projects and can negatively impact terrestrial and aquatic wildlife populations as well as snag in maintenance machinery, resulting in costly repairs and delays. Wildlife entanglement in, and death from, plastic netting and other man-made plastic materials has been documented in birds, fish, mammals, and reptiles.[24]

Mitigative Measures

Minnesota Power has stated that it does not believe that the project area contains open waters sizeable enough to attract the presence of water birds. The open water wetlands that are present around the project area are industrial in nature and do not provide habitat required by waterfowl. This, along with the relatively small (3 miles long) area involved in the project in comparison to the surrounding area available for avian migration led to Minnesota Power's decision not to propose the installation of swan diverters along the transmission line.

Avoiding the use of photodegradable erosion-control materials where possible and the use of biodegradable materials (typically made from natural fibers), preferably those that will biodegrade under a variety of conditions, can minimize the impact to wildlife. The HVTL Route Permit could include the use of these materials as a standard condition.

With regard to other wildlife species, it is anticipated that any habitat displacement resulting from the proposed project will be temporary. Therefore, no wildlife mitigation measures are proposed.

5.14 Rare and Unique Natural Resources

Construction and maintenance of transmission lines might destroy individual plants and animals or might alter their habitat so that it becomes unsuitable for them. For example, trees used by

[24] http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf

rare birds for nesting might be cut down or soil erosion may degrade rivers and wetlands that provide required habitat.

In some limited cases, transmission line ROWs can be managed to provide habitat for endangered/threatened resources. An example includes osprey nesting platforms built on top of transmission poles.

Endangered species are species whose continued existence is in jeopardy. Threatened species are likely to become endangered. Species of special concern have some problems related to their abundance or distribution, although more study is required.

The MnDNR Division of Ecological and Water Resources manages the Natural Heritage Information System (NHIS) which provides information on Minnesota's rare plants, animals, native plant communities, and other rare features. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and conservation of these features.

However, some areas of the state have not been surveyed extensively or recently, so the NHIS database cannot be relied upon as a sole information source for rare species.

The MnDNR NHIS database was queried by the Applicant to obtain the locations of rare and unique natural resources within the project area. The results of this search are shown on **Figure 12**.

The review of the NHIS database did not identify any state-listed species within the proposed route or within a 1-mile buffer around the proposed route. Minnesota Power submitted a letter to the Minnesota DNR on October 5, 2012, describing its NHIS database search and requesting any additional information or concerns. The MnDNR responded via email on November 5, 2012, concurring with Minnesota Power's assessment that there are no known occurrences of rare features within one-mile of the project area.

The Fish and Wildlife Service (USFWS) website was reviewed by the Applicant for a list of species covered under the Endangered Species Act (ESA) that may be present within St. Louis County. According to the website, the following two federally listed species are known to occur within the county: piping plover (*Charadrius melodus*) and Canada lynx (*Lynx canadensis*).

The Great Lakes population of piping plover is federally listed as endangered and Critical Habitat is designated in St. Louis County. Great Lakes piping plovers use open, sandy beaches, barrier islands, and sand spits formed along the Great Lakes' perimeters (FWS, 2012b). They do not inhabit lakeshore areas where high bluffs formed by severe erosion have replaced beach habitat. They prefer sparsely vegetated open sand, gravel, or cobble for nesting sites and forage along the rack line where invertebrates are most readily available (FWS, 2012c). The proposed

project is not located within designated Critical Habitat nor does the appropriate habitat occur within the proposed route.

The Canada lynx is federally listed as threatened and Critical Habitat is designated in St. Louis County. Lynx live in dense forests with boreal features across northern Minnesota in areas that receive deep snow and have high-density populations of snowshoe hares, the principal prey of lynx (FWS, 2012d). Although the proposed route is not located within designated Critical Habitat, the general project area could be populated with Canada lynx at the time of construction based on distribution in the state.

Potential Impacts

It is anticipated that the proposed project will have no effect on the piping plover or its habitat.

It is anticipated that the project impacts on the Canada lynx would be minor and temporary. Noise and/or physical disturbance would prompt the lynx to temporarily vacate the area for a short period of time and the lynx could return to the area shortly after cessation of activities. Lynx movement may be temporarily impeded and individuals may be displaced, but the impacts on the Canada lynx population would likely be minimal if not negligible.

Mitigative Measures

The environmental review process is designed to identify rare species and unique natural resources so that the various routing options can be designed to avoid encroachment and effects on these items to the greatest extent practicable. Since no impacts to rare or endangered resources are anticipated, no mitigative measures are warranted.

6.0 Unavoidable Impacts

During construction of the proposed HVTL, there would be temporary unavoidable adverse impacts on the existing flora and fauna, soil, and traffic in those locations where construction would occur adjacent to an existing roadway. Some of these impacts may occur, on a lesser scale, during maintenance of the transmission line. Longer-term, non-temporary adverse impacts related to construction and maintenance of the proposal transmission line include loss of forested areas, including forested wetlands, within the ROW; visual impacts; impacts to migratory birds from collisions with the lines; and potential impacts to property values.

In addition, there are few commitments of resources associated with this project that are irreversible and irretrievable, but those that do exist are primarily related to construction. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

The proposed HVTL will require the commitment of land (a ROW of 3.0 miles in length and 100 feet wide, depending of other ROW sharing) and while it is possible that the structures and conductors could be removed, and the ROW returned to the natural landscape, this is unlikely to happen in the foreseeable future.

The proposed HVTL may result in the loss of some forests and forested wetlands. While these are not irreplaceable, replacing them will take a significant amount of time. The ROW for certain land uses will be lost. In most cases, this ROW can continue to be used for many purposes; however, some other areas, such as forested areas, areas with minable resources, or areas that could have been used for other construction, will be converted during the lifetime of the project.

Construction resources that would be used include aggregate resources, concrete, steel, and hydrocarbon fuel. These resources would be used to construct the project. During construction, vehicles would be traveling to and from the site utilizing hydrocarbon fuels. However, once built, the proposed HVTL will not consume raw materials.

7.0 Application of Routing Factors

The Power Plant Siting Act requires the Commission to locate transmission lines "in an orderly manner compatible with environmental preservation and the efficient use of resources" and in a way that minimizes "adverse human and environmental impact while insuring" electric power reliability.[25] Minnesota Statute Section 216E.03, subdivision 7(b) identifies considerations that the Commission must take into account when making its final determination on routing of HVTLs. Minnesota Rule 7850.4100, lists 14 factors to guide Commission route designations, including the evaluation and minimization of adverse environmental impacts, impacts to public health and welfare, and adverse economic impacts. These factors are outlined in Section 2.5 Final Decision of this document.

In this section, the information gathered from the RPA and the review process is applied to these factors.

Factors for Which Impacts are Anticipated to be Minimal
Based on the information in the RPA and EA there are routing factors for which adverse impacts of the project will be minimal. These routing factors concern effects to:

- human settlement (including factor elements socioeconomics, displacement, aesthetics, noise, property values, cultural values, recreation, electronic communications and public services);
- public health and safety (including factor elements electric and magnetic fields, implantable medical devices, stray voltage and induced voltage);
- land based economies (including factor elements agriculture, forestry, tourism, and mining);
- archaeological and historic resources;
- natural environment - factor element air quality, and;
- unique natural resources.

A discussion on these routing factors and elements is located in Chapter 5 of this document.

Factors for Which Impacts, Through the Use of Mitigation Strategies, are Anticipated to be Minimal to Moderate
Based on the information in the RPA and EA there is a routing factor for which adverse impacts of the project will be minimal given the application of mitigative strategies identified in the EA. This routing factor concerns the potential impacts to the natural environment factor elements water quality, flora and fauna.

[25] Minnesota Statute 216E.02

Water Quality – With the implementation of Best Management Practices[26] the construction and operation of the proposed project is not anticipated to result in adverse or significant impacts to wetlands and water bodies in the project area. The Applicant will be required to prepare a Storm Water Pollution Prevention Plan (SWPP) that outlines the BMPs for erosion prevention and sediment control. As part of the SWPP Plan, the Applicant will be required to prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize the potential for spills of hazardous materials and their transport to streams and other water bodies.

Flora – The transmission line ROW will be restored and vegetation reestablished through re-seeding and mulching. To inhibit weeds from becoming established on the new ROW, disturbed areas will be stabilized and replanted as soon as practicable with a seed mix approved by the DNR. Equipment and vehicles used in weed control efforts will be thoroughly cleaned before moving to non-infested areas.[27]

Fauna – It is unlikely that the construction, operation, and maintenance of the proposed project would have a permanent effect on fauna present in the area. Wildlife that inhabits trees that may be removed for the HVTL will be displaced, however, comparable habitat is near the route, and it is likely that these organisms would only be displaced a short distance.

Electrocution of avian species occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Minnesota Power transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution and will minimize potential avian impacts of the proposed project.

A variety of manufactured products (netting) may be used during construction projects to temporarily protect soil from erosion and facilitate establishment of vegetation Plastic netting used in these products has been found to entangle wildlife, including reptiles, amphibians, birds, and small mammals. Oxo-degradable or oxo-biodegradable plastic has a chemical additive that helps speed up degradation of the plastic, as long as the necessary elements of oxygen and microorganisms are available, leaving a residue of plastic pellets in the environment. To avoid adversely impacting reptile and bird species, Minnesota Power will not use plastic mesh erosion control materials.[28]

Factors Which are Met and/or Adequately Addressed

Some routing factors are applicable to the State's goal of ensuring electric energy security through efficient, cost-effective power supply and transmission infrastructure. These routing factors are:

[26] http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesotas-stormwater-manual.html
[27] RPA at p. 5-6; EA at Section 5.13
[28] RPA at p. 5-5; EA at Section 5.13

- design options (including factor elements energy efficiency, and ability to accommodate expansion);
- use of or paralleling existing ROWs (including factor elements survey lines, natural division lines, and agricultural boundaries);
- use of existing infrastructure ROWs (including factor elements roads/highways, rail roads, pipelines, and transmission lines), and;
- route and design dependent costs (including factor elements construction, operation and maintenance).

The information contained in the RPA and EA indicate that these factors have been met.

Design Options – The proposed project is a relocation of an existing 115 kV transmission, at the request of United Taconite, to accommodate its expanding mining operation located west of the city of Eveleth.[29] The rebuilding/replacing of the transmission is necessary to allow the existing line to be removed without degrading the area's high voltage transmission system.[30]

Use of or Paralleling Existing ROWs - The proposed route is within or adjacent to County Road 101 and an existing haul road right-of-way for approximately 52 percent of the length of the route.[31]

Use of existing infrastructure ROWs - Where the HVTL parallels existing infrastructure right-of-way (e.g., roads, railroads, other utilities) and to the extent practicable, the transmission line ROW will be overlapped upon the existing ROW.[32] When the HVTL is parallel to a roadway, poles will generally be placed 5 feet within the private property adjacent to the roadway. Therefore, a little less than half of the transmission line right-of-way will share the existing road right-of-way, resulting in an easement of lesser width being required from the landowner.[33]

Route and Design Dependent Costs - Minnesota Power estimates that the project, which includes the installation of the new 115 kV HVTL and removal of the existing transmission line, will cost approximately $2 million. Operation and maintenance costs for the HVTL are estimated to be $585 per mile.[34] In developing its proposed route, Minnesota Power evaluated and rejected an alternative HVTL route that also followed existing ROWs (i.e., HVTLs and railroad) for the majority of its length, originating east of Eveleth in Gilbert Township and terminating southwest of Eveleth where it interconnected with the 37 Line Tap.[35] This route was rejected due to its considerable length, cost and greater impact on private landowners.

[29] RPA, at p.1-3; EA at Section 3.0
[30] RPA, at p. 3-1; EA at Section 3.0
[31] RPA at p. 4-1; EA at Section 3.0
[32] RPA at p. 5-2; EA at Section 3.0
[33] Id
[34] RPA at p. 3-2; EA at Section 3.0
[35] RPA, p.4-2, figure B-9; EA at Section 3.0

Factors relating to Unavoidable Impacts, and/or the Irreversible and Irretrievable Commitments of Resources

The final two factors concern implications of irreversible and irretrievable commitments of resources and the unavoidable impacts associated with the implementation of the proposal.

Irreversible and Irretrievable Commitments of Resources

A commitment of resources is irreversible when its primary or secondary impacts limit the future option for a resource. An irretrievable commitment refers to the use or consumption of resources that is neither renewable nor recoverable for later use by future generations. The commitment of resources refers primarily to the use of nonrenewable resources such as fossil fuels, water, and other materials (aggregate minerals, steel/metals, etc.).

Construction activities would require the use of fossil fuels for electricity and for the operation of vehicles and equipment. Use of raw building materials for construction would be an irretrievable commitment of resources from which these materials are produced. The use of water for dust abatement during construction activities would be irreversible. Commitment of labor and fiscal resources to develop and build the project is considered irretrievable.

Unavoidable Impacts

Where feasible, the EA suggest mitigation measure to be incorporated into the planning, design, and construction of the proposed project to substantially eliminate the adverse impacts. In other areas of consideration, adverse impacts can be reduced but not eliminated and are therefore determined to be unavoidable. Most unavoidable adverse impacts would occur during the construction phase of the proposed project and would be temporary.

A review of impacts and possible mitigation measures is located in Chapter 5 of this document; the unavoidable adverse effects caused by the proposed project that would remain after applying mitigation measures are discussed in Chapter 6.

Unavoidable adverse effects related to proposed project construction would last only as long as the construction period, and would include the following:

- Soil compaction, erosion, and vegetation degradation.
- Disturbance to wetland vegetation and soil.
- Disturbance to and displacement of some species of wildlife.
- Disturbance to nearby residents.
- Traffic delays in some areas.
- Minor air quality impacts due to fugitive dust.

Unavoidable adverse effects related to proposed project that would last at least as long as the life of the project would include the following:

- The addition to the visual landscape of transmission towers and lines.
- Habitat type changes and fragmentation.

- Adverse impacts to wildlife and wildlife habitat due to project-related changes to wetland type (PFO to PSS), and the removal of other vegetation.
- Direct adverse impacts to wildlife as a result of avian collisions.

Figures

Appendix A – Scoping Decision

Appendix B – Sample Route Permit