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Abstract

Minnesota Power (Applicant or MP) submitted an application to the Minnesota Public Utilities Commission for a high voltage transmission line (HVTL) Route Permit to construct two parallel, approximately 4.5-mile 115 kilovolt (kV) high voltage transmission lines (HVTL) and a new substation called the Canisteo Substation. The proposed project is located in Itasca County, Minnesota, near the cities of Coleraine and Bovey.

The Applicant submitted its HVTL route permit application to the Commission on October 9, 2013. The route permit application was accepted as complete by the Commission on December 17, 2013. The docket number for the HVTL Route Permit proceedings is E015/TL-13-805.

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 Environmental Review and Analysis (EERA) staff is responsible for conducting the environmental review for route permit applications submitted to the Commission (Minn. Rules 7850). Accordingly, EERA staff has prepared this environmental assessment (EA) for the MP Canisteo HVTL project. This EA addresses the issues required in Minnesota Rule 7850.3700, subpart 4, and those identified in the Department's scoping decision of February 5, 2014.

Persons interested in this project can place their names on the Project Mailing List by contacting the Public Advisor: Tracy Smetana at consumer.puc@state.mn.us, 651-296-0406 or 1-800-657-3782. Documents of interest can be found on the eDockets system: https://www.edockets.state.mn.us/EFiling/search.jsp (enter the year "13" and the number "805").

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 Canisteo HVTL project is anticipated by July 2014.

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
EERA	Department of Commerce Energy Environmental Review & Analysis
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
RPA	Route Permit Application
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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Appendix A. EA Scoping Decision
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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 two new 115 kV transmission lines in the Itasca County pursuant to Minnesota Statutes Section 216E and Minnesota Rules Chapter 7850.

The Department of Commerce Energy Environmental Review and Analysis (EERA) 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.
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

Minnesota Power proposes to construct two, approximately 4.5-mile, 115 kV HVTLs and a substation near Coleraine, Minnesota (**Figure 1**). The two transmission lines, each approximately 4.5 miles in length, would be constructed parallel to one another with an overlapping ROW of 160 feet. The key components of the proposed project include:

- The proposed HVTLs would connect to Minnesota Power's existing 28 Line west of Scenic Highway 7, traverse south across Reilly Beach Road to the Canisteo Pit, and then turn southwest where they would terminate at the proposed Canisteo Substation.

- The new Canisteo Substation would be constructed north of County Highway 61 and east of County Road 325 near the western edge of the Canisteo Pit.

1.2 Project Location

The proposed project is located in Itasca County, Minnesota, near the cities of Coleraine and Bovey.

Table 1 below summarizes the proposed project location.

Table 1. Project Location

Township	Range	Section	County
56N	24W	5	Itasca
56N	24W	8	Itasca
56N	24W	16	Itasca
56N	24W	17	Itasca
56N	24W	19	Itasca
56N	24W	20	Itasca
56N	24W	21	Itasca
56N	24W	30	Itasca
56N	25W	25	Itasca

1.3 Project Purpose

The proposed project was designed to meet the power needs of the planned Magnetation plant. The Magnetation plant will be designed to produce iron ore concentrate by recovering weakly magnetic iron oxide particles from low-grade natural ore tailings basins, already-mined iron formation stockpiles, and newly-mined iron formation. Magnetation's initial focus is on

exploitation of the hematite and magnetite contained in natural ore waste tailings basins created over the last 100 years of mining operations on the Mesabi Iron Range of Minnesota.

Since the late 1800s, iron mines in the Iron Range of northern Minnesota have been discarding fine, particle-sized minerals that are a waste product of mining operations. These tailings were pumped in a water-slurry form into impoundment dikes that formed tailings basins covering large areas. These waste tailings basins represent ore bodies to Magnetation. Magnetation's project is a significant economic development opportunity for the area.

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, October 9, 2013. 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 Department of Commerce and Environmental Quality Board 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).

The Applicant has stated that the Canisteo HVTL project is exemption from the certificate of need requirements under Minnesota Statutes Section 216B.243, which exempts HVTLs of 115 kV that are less than 10 miles in length.

Additionally, the Applicant has stated that the Canisteo HVTL project would be built to primarily distribute electricity to serve the demand of a single customer at a single location and therefore meets an exemption from the certificate of need requirements under Minnesota Statutes Sections 216B.243, subdivision 8 (2).

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 Canisteo HVTL pursuant to the provisions of the Alternative Permitting Process outlined in Minnesota Rules 7850.2900. 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 Environmental Review and Analysis web page at:

http://mn.gov/commerce/energyfacilities/Docket.html?Id=33603

The EERA 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 November 26, 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 Wednesday, December 18, 2013, Commission staff and EERA staff jointly held a public information/scoping meeting at the Bovey City Hall. The meeting began at 6:30 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; 1 individual 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 Magnetation's operation, design/construction of structures; 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, January 3, 2014.

Three written comment were received: Minnesota Power submitted a comment modifying the proposed location of the substation and providing the potential environmental and land use

[1] Notice of Public Information/Scoping Meeting, eDocket No. 201311-94081-01

[2] Oral Comments Received During Scoping, eDocket No. 20141-95097- 01

impacts associated with this change, the Department of Natural Resources (MnDNR) submitted comments regarding the potential substation site encumbrance of state mineral resources, and the Department of Transportation (MnDOT) submitted comments on its policy and procedures for accommodation of utilities.

Since the submission of the HVTL Route Permit Application, Magnetation's plant location had changed; to facilitate this change Minnesota Power was required to change the location of the proposed substation.[3]

The DNR expressed support for the relocation of the proposed substation and reiterated the requirements of the License to Cross Public Lands and Waters.[4]

MnDOT stated that upon initial review of the project, it appears that the proposed transmission lines and associated substation do not directly abut a state trunk highway. MnDOT did request that the agency be made aware of any changes to the proposed project that may make the project area close enough to occupy a portion of current MnDOT right-of-way.[5]

These items and issues, along with the typical HVTL routing impacts, were incorporated into the EERA staff's recommendation to the Department Deputy Commissioner on the Environmental Assessment Scoping Decision.

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
The Applicant provided no further comments following the close of the EA Scoping comment period.

Scoping Decision
On January 30, 2014, the Commission at its regularly scheduled meeting, considered what action, if any, the Commission should take in regard 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 February 5, 2014. A copy of this decision is attached in the **Appendix A**. The items and issues

[3] Written Comment Received During Scoping, eDocket No. 201312-94704-01
[4] Written Comment Received During Scoping, eDocket No. 20141-95117-01
[5] Written Comment Received During Scoping, eDocket No. 20141-95122 -01

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 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 late May 2014 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=33603 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 EERA 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

Permit	Jurisdiction
Federal	
Section 404 Jurisdictional Determination/Permit	U.S. Army Corps of Engineers (ACOE)
State	
Route Permit	MPUC
Utility Permit	MnDOT
NPDES Construction Stormwater Permit	MPCA
Section 401 Water Quality Certification	MPCA (required if the ACOE requires an individual permit for wetland dredging and filling activities, this certification is required)
Local	
Minnesota Wetland Conservation Act Certification	Itasca County

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 Itasca County near and within the municipalities of Coleraine and Bovey. **Figures 2 through 13** illustrate the proposed HVTL on aerial photographs. **Figure 14** illustrates the proposed substation location.

The project includes the construction of approximately 4.5-miles of new, parallel 115 kV transmission lines as part of a project to accommodate the power needs of the planned Magnetation plant. The Magnetation plant will be designed to produce iron ore concentrate by recovering weakly magnetic iron oxide particles from low-grade natural ore tailings basins, already-mined iron formation stockpiles, and newly-mined iron formation.

The proposed HVTLs would connect to Minnesota Power's existing 28 Line west of Scenic Highway 7, traverse south across Reilly Beach Road to the Canisteo Pit, and then turn southwest where it would terminate at the proposed Canisteo Substation Location. Potential routing options were constrained by a need to balance the planned location of the Magnetation plant site and avoiding current and future mining activities within the project area.

Opportunities to locate the new HVTLs along existing infrastructure (e.g., roads, railroads, other utilities) between the existing 28 Line and the Magnetation site were not available; resulting in a proposed route which includes a stand-alone right-of-way (ROW).

The new Canisteo Substation would consist of two 115/4.16 kV transformers and one 115/13.8 kV transformer along with associated equipment including, circuit breakers, air break switched, instrument transformers, surge arrestors, and, control house. The estimated dimensions for the new Canisteo Substation are 290 feet by 220 feet. **Figure 15** shows the proposed substation dimensions and preliminary layout. The revised substation location is located approximately a half mile from the location originally identified in the HVTL Route Permit Application, in the NE ¼ SE ¼ Section 25 TWN 56N RNG 25S. The revised substation location remains entirely within the originally proposed route. As a result of this change the proposed route has been shortened by approximately 2,600 feet (**Figure 16**).

3.1 Right-of-Way Requirements

The Power Plant Siting Act (Minnesota Statutes, chapter 216E) authorizes the Commission to meet its routing responsibility by designating a *route* for a new transmission line when it issues a HVTL Route Permit. A Route means the location of a high voltage transmission line between two end points and may have a variable width of up to 1.25 miles. The right-of-way is the land interest required within a route for the construction, maintenance, and operation of a high voltage transmission line.

To aid the siting of the ROW, given the constraints between the end points, the Applicant has requested a route width of 1,000 feet in which to site the 160-foot width required for the ROW.

Right-of-Way Acquisition

This project will require approximately 4.5 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	Typical ROW Width (feet)	Approximate Structure Height (feet)	Structure Base Diameter (inches)	Foundation Diameter (feet)	Span Between Structures (feet)
Single Circuit 115 kV	H-Frame	Wood or Steel	100	Ranges from 60-75ft	Ranges from 16-62"	Wood: direct embed Steel: 6-8ft	600ft +/-100ft
Single Circuit 115 kV	Monopole Angle	Wood or Steel	100	Ranges from 60-110ft	Ranges from 18-72"	Wood: direct embed Steel: 6-8ft	300ft +/-100ft

3.2 Project Construction and Maintenance

Minnesota Power's proposed 4.5 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 110 feet above ground, and the spans adjacent to these structures will be approximately 300 feet (**Table 3**).

H-Frame structures will utilize two braced wood poles and suspension insulators. These structures will range in height from 60 to 75 feet above ground, and the spans adjacent to these structures will be approximately 600 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 17.**

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 ROW 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.

Substation construction requires stripping of topsoil, excavation of material for installation of shallow and deep (non-surface/drilled shaft) foundations, erection of structural steel, installation of above- and below-grade electrical conduit, conductors and equipment, placement of gravel and crushed rock surfacing, and establishment of a fenced perimeter.

A modular industrialized Electrical Equipment Enclosure (EEE), approximately 20 feet wide, 40 feet long, and 14 feet in height would be utilized at the site. The EEE would be fabricated off-site, and would be completed on-site upon delivery of the multiple modules. Some structural steel components may be as much as 60 feet in height, but a majority would be 20 feet or less in height. Accordingly, a tele-handler implement, and a rough- or all-terrain crane, would be required intermittently. The deep foundations would have a maximum depth of 20 feet, and would be excavated by an earth auger.

Substation equipment would be trucked to the site and may require additional assembly before final placement. During the construction phase of the substation, there would be staging and temporary storage of equipment and supplies, as well as the creation of stockpiles of excavated material, in the immediate vicinity and limits of the substation site and aforementioned staging areas. These items would be removed at the conclusion of the construction phase.

Substations require a certain amount of maintenance to keep them functioning in accordance with accepted operating parameters and the NESC requirements. Transformers, circuit breakers, batteries, protective relays, and other equipment need to be serviced periodically in accordance with the manufacturer's recommendations. The Substation Location must be kept free of vegetation and adequate drainage must be maintained. Minnesota Power personnel are typically on site at least once a week and maintenance needs are noted and scheduled for completion.

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 spring 2015 in-service date. Construction would be expected to begin in winter of 2014. 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 construction of the Canisteo Substation would cost approximately $6.2 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.

In developing its proposed route, Minnesota Power evaluated and rejected an alternative HVTL route (**Figure 18**) that originated from Minnesota Power's existing Diamond Lake Tap. This option posed a number of electrical challenges. The Diamond Lake Tap is one of three existing taps already on Minnesota Power's 28 line; a tap off the Diamond Lake Tap would present an unacceptable degree of load risk from a single line outage. To accommodate the proposed need, a Diamond Lake Tap would need to be reconfigured and rebuilt. Significant outages on MP 28 line would be necessary to make these reconfigurations. This would affect the 3 existing taps that serve the Cohasset, Taconite and Nashwauk areas. It would also require an outage at Magnetation's Plant 2.

This environmental assessment only addresses the human and environmental impacts associated with the proposed transmission line.

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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 vegetation 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 Itasca County, Minnesota, near the cities of Bovey and Taconite; this area lies within the *Laurentian Mixed Forest Province* under the ECS. This classification extends from northern Minnesota, Wisconsin and Michigan to 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.

The project lies within the ECS *St. Louis Moraines Subsection* of the *Northern Minnesota Drift* and *Lake Plains Section*, near the transition between the Nashwauk Uplands and St. Louis Moraines Subsections. The St. Louis Moraines Subsection is characterized by gently rolling to rolling lake plains and till plains. The Mississippi river bisects this Subsection. The project area includes Lowland Black Spruce, Aspen, Maple and Pine. Much of this subsection is presently forested and forestry is one of the most important land uses. Tourism and recreation associated with lake and outdoor activities are also important in the region. Agriculture is also an important local land use, but is primarily prevalent in the western part of the subsection.

The underlying geology and topography near Bovey and Taconite 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, Itasca County is 93.7 percent Caucasian; minority groups in the area constitute a very small percentage of the total population, averaging 5 percent in the county and between 4.6 and 6.2 percent in the nearby cities of Coleraine and Bovey, respectively. Persons living in poverty make up 11.4 percent of the population; for comparison, minorities comprise 15.9 percent of the statewide population and 11 percent of Minnesota residents live in poverty

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 aspects 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.

It is not expected that additional permanent jobs will be created by the project, but the project is necessary for construction of the Magnetation mining project which would create 160 long-term jobs in the area.. 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.

Table 4. Population and Economic Profile, 2012

Location	Population	Minority Population (percent)	Caucasian Population (percent)	Per Capita Income	Percentage of Population Below Poverty Level
Coleraine	1,970	4.6*	95.4	16,514	9.8
Bovey	804	6.2*	93.8	16,127	22.3
Itasca County	5,303,925	5.5*	93.7	24,067	11.4

*Sum of Black persons, American Indian and Alaska Native persons, Asian persons, Native Hawaiian and Other Pacific Islander persons and Persons of Hispanic or Latino Origin percentages.

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 Itasca 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 transmission 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[6]. 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.*
>
> *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:

[6] 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 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:

- 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.
- 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.[7]

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.[8]

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:[9]

- 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

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*

[7] Adapted from Wisconsin Public Service Commission, June 2001. *Environmental Impacts of Transmission Lines.* http://psc.wi.gov/thelibrary/publications/electric/electric10.pdf, p. 17.
[8] 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
[9] Pitts, Jennifer M. and Thomas O. Jackson. 2007. "Power Lines and Property Values Revisited." *The Appraisal Journal. Fall, 2007.*

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.*[10]

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.

5.3 Displacement

Displacement of residential homes or businesses is not anticipated. There are three dwellings located either within or adjacent to the proposed route (**Figure 19**).

The first dwelling (parcel number 97-019-4302) is located north of County Road 353 in S19, T56, R24 and lies just outside of the proposed route, approximately 1,250 feet north of the anticipated alignment/ROW (**Figure 20**).

The second dwelling (parcel number 88-020-1200) is located south of an unnamed water-body in S20, T56, R24 and lies within the proposed route, approximately 900 feet northwest of the anticipated alignment/ROW(**Figure 21**) .

[10] 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

The third dwelling (parcel number 97-008-1101) is located north of Reilly Beach Road in S8, T56, R24 and lies within the proposed route approximately 700 feet west of the anticipated alignment/ROW (**Figure 22**).

Given the anticipated alignment/ROW, no existing structures along the proposed route would fail to meet the NESC safety codes.

Potential Impacts

Displacement of residential homes or businesses is not anticipated; only two dwelling lie within the proposed route and neither lies within the anticipated ROW/alignment. It may be possible for the Permittee to work with landowners to discuss advantageous placement of the alignment on affected properties.

Mitigative Measures

No mitigative measures are required.

5.4 Noise

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 three dwellings within 1,250 feet of the proposed alignment centerline. The first is north of County Road 353 in S19, T56, R24 and lies 1,250 feet north of the proposed centerline. The second is south of an unnamed water-body at the intersection of sections 17 and 20 (T56, R24) and lies approximately 900 feet northwest of the proposed centerline. The third is north of Reilly Beach Road in S8, T56, R24 and lies approximately 700 feet west of the proposed centerline.

Noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible. Given the distance to the nearest potential receptors the noise levels from the new line should not be noticeably.

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 24.14 and 20.64 dBA (two parallel 115 kV H-Frame), 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 L_5 (Edge of ROW) (Decibels a weighted)	Noise L_{50} (Edge of ROW) (Decibels a weighted)
Two Parallel 115 kV H-Frame	24.14	20.64

Transformer hum is the dominant noise source at substations. Transformer hum is caused by magnetorestrictive forces within the core of the transformer. These magnetic forces cause the core laminations to expand and contract, creating vibration and sound at a frequency of 100 Hz (twice the a.c. main's frequency), and at multiples of 100Hz (harmonics). Typically, the noise level does not vary with transformer load, as the core is magnetically saturated and cannot produce any more noise.

Given the distance of over 1.25 miles from the proposed substation location to the nearest home (receptor), it would be very unlikely that substation noise would be audible to the residents. The proposed substation would be designed and constructed to comply with state noise standards established by the MPCA. It is also likely that noise from mine operations would exceed those of the substation.

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 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, Minnesota Power 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

Aesthetics refer to the natural and built landscape that contribute to the public's experience and appreciation of their environment. Features, such as wetlands, surface waters, landforms, forests and vegetation patterns are among the natural landscape features that define an area's visual character. Buildings, roads, bridges and other structures represent the built environment and its reformations to the natural landscape. The scenic value or visual importance of an area is a subjective matter and depends upon the perception and philosophical and/or psychological response of the viewer. The level of impact to visual resources is also subjective and generally depends on the sensitivity and exposure of a particular viewer and can, therefore, vary greatly from one individual to the next.

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 (angle) and H-Frame direct embedded wood or steel structures. Monopole angle structures will range in height from 60 to 110 feet above ground, and have an approximate span of 300 feet. H-Frame structures will utilize two braced poles and suspension insulators, will range in height from 60 to 75 feet above ground, and have an approximate span of 600 feet.

Potential Impacts

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 area will limit the extent to which the new lines are viewed as a disruption to the area's scenic integrity.

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

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 ten percent.

Due to the conductor configuration of the two parallel 115 kV H-Frame type structure, the peak EF for this configuration actually occurs at approximately 9 feet from the centerline of the ROW, and is not given in Table 7 The maximum EF was calculated to be 1.93 kV/m at one meter above ground.

Table 7. Calculated Electric Fields (kV/m)

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline (feet) of ROW												
		-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
2 Parallel 115 kV H-Frame	126.5	0.01	0.02	0.17	0.50	1.43	1.00	1.90	1.00	1.43	0.50	0.17	0.02	0.01

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).

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.

Due to the conductor configuration of the two parallel115 kV H-Frame type structure, the peak MF for this configuration actually occurs at approximately 27 feet from the centerline of the ROW, and is not given in Table 8. This peak MF was calculated to be 154.73 mG under the conductor thermal limit condition and 52.86 mG under the expected peak loading condition.

Table 8. Calculated Magnetic Flux Density (milligauss)

Structure Type	Current (Amps)	Distance to Proposed Centerline (feet) of ROW												
		-300	-200	-100	-75	-50	-25	0	25	50	75	100	200	300
Magnetic Field Profile at Conductor Thermal Limits														
2 Parallel 115 kV H-Frame	West: 602.5 East: 602.5	0.34	1.18	10.35	26.41	87.79	154.72	113.89	154.72	87.79	26.41	10.35	1.18	0.34
Magnetic Field Profile at Expected Peak Loading														
2 Parallel 115 kV H-Frame	West: 214.1 East: 149.6	0.19	0.57	4.11	9.95	31.44	52.72	34.41	40.70	21.62	6.02	2.15	0.15	0.02

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.

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			

Source: EMF In Your Environment, EPA 1992

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 above 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.

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.[11]

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.

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

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 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.

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.

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.

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

The project area is located in a region that is known for its outdoor recreation opportunities. The region includes vast areas of forest, lakes, rivers and streams, making it a destination for outdoor recreation. The area offers opportunities for fishing, kayaking, boating, cycling, hiking, hunting, cross country skiing and snowmobiling.

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 proposed project is located north of Mount Itasca winter sports facility which includes alpine skiing, snowboarding, cross country skiing, biathlon, ski jumping, and tubing activities. The

proposed project is across County Highway 61 and the Canisteo Pit from this facility and would not have any adverse impact on it. Hill Annex Mine State Park is 5.6 miles east and the Keystone Snowmobile Trail passes 0.16 miles to the south of the proposed route. There are numerous tourist attractions in the city of Grand Rapids, approximately four miles southwest of the proposed project.

Potential Impacts

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

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.

The proposed route crosses areas zoned as tourism/recreational, municipal, industrial and public (**Figure 23**).

Agriculture

There is no prime farmland or prime farmland if drained within the route requested by Minnesota Power. There are no croplands within the route requested by Minnesota Power (**Figure 24**).

Forestry

There are no known tree farms or federal or state forests located within the proposed route or proposed substation location. There is one quarter quarter-section that intersects the 1,000 foot route that is administered by the MnDNR Department of Forestry (see Figure 19). The MnDNR filed comments concerning this block of land on March 21, 2014;[12] in that letter the MnDNR stated that a License to Cross Public Lands would be required for this parcel. This license would speak to the issues of alignment and timber value.

The proposed route does not impact any managed forests or nurseries. No privately-owned forest production industry would be affected by the project.

[12] Letter from MnDNR to EERA, eDocket No. 20143-97512-01

Tourism

There are no official tourists/recreational areas present within the proposed route or proposed substation location. However, nearby lakes, rivers, parks, forests, and the Mount Itasca winter sports facility, provide a variety of outdoor recreational activities for tourists visiting the area.

A portion of the proposed route crosses land zoned as Tourism/Recreational but no planned tourism or recreational development for that area is identified in the Itasca County Comprehensive Land Use Plan (see Figure 23). Construction of the proposed HVTLs on land zoned as tourism/recreational would not adversely affect recreation or limit movement.

Mining

The Applicant's stated need and purpose for the project is to provide power to Magnetation's new taconite mining operation. The majority of the approximately five-mile HVTLs would be on mine land. The proposed project would have a positive impact on mining by enabling Magnetation's operation. The proposed route has been developed with input from Magnetation and the Minnesota DNR to ensure the proposed route does not interfere with Magnetation's planned mining operations or encumber land under the administration of the DNR's Division of Lands and Minerals.

The Applicant has stated that it will continue to coordinate design and construction of the HVTLs with both Magnetation and the DNR.

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 intersects lands within the jurisdiction of the cities of Bovey, Coleraine and Taconite; these areas include lands that are zoned as tourism/recreational, municipal, industrial and public purposes.

Based on a review of recent aerial photography conducted by the Applicant, there are 78 dwellings and 13 commercial properties within a mile area surrounding the proposed route. There are 3 dwellings within 1,250 feet of the anticipated alignment (see Figure 19).

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

Table 11. Distance to Structures

Structure Type	Proposed Route	Number of Structures within Various Distances		
		Within ROW	Within One Mile of Proposed Route	Within 1,250 Feet of Anticipated Alignment
Residence	115 kV Route	0	78	3
Commercial	115 kV Route	0	13	0

Potential Impacts

The project will require approximately 4.5 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.

Based on the Applicant’s route evaluation/development work and the project’s remote location, the proposed route is able to avoid displacement of any homes or businesses. If the alignment deviates from that which is anticipated due to unforeseen challenges, the Applicant has stated that every effort will be made to maintain a 500-foot buffer from the dwellings identified above.

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, 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

Public services and facilities in the project area generally include emergency services provided by government entities, including hospitals, fire departments, and police departments, water supply or wastewater disposal systems, and gas and electricity services, and existing and future transportation corridors and projects.

The nearest hospital is Grant Itasca, located approximately 9 miles away in the city of Grand Rapids. The HVTLs would only cross one road, Reilly Beach Road, and is therefore unlikely to have an impact on public services outside of short closures for initial construction.

Transportation infrastructure in the vicinity of the proposed route includes roads and one railroad. The proposed route runs from the existing Minnesota Power 28 Line west of Scenic Highway 7 and crosses Reilly Beach Rd as it traverses south to the Canisteo Pit then southwest to the proposed Canisteo Substation.

Roadways can potentially be impacted temporarily during construction activities and during maintenance of the transmission line. Impacts could result from construction vehicles and safety perimeters temporarily blocking public access to streets and businesses. Access during construction and maintenance is expected to be primarily from existing roads. Due to the temporary nature of the proposed construction activities, traffic disruptions are expected to be minor and temporary. Structure placement along roadways can also impact future road expansions, as structures placed within the ROW must be moved to allow a safe distance between structures and the edge of the roadway.

The Minnesota Department of Transportation (MnDOT) submitted comments during the scoping period; while MnDOT stated that the proposed transmission lines and associated substation did not directly abut a state trunk highway, the agency requested to be made aware of any changes to the proposed project that may place the proposed route close enough to occupy a portion of MnDOT right of way.

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.

Any required temporary lane closures on Reilly Beach Road will be coordinated with the local jurisdictions, and would provide for safe access of police, fire and other rescue vehicles.

Construction and operation of the proposed project is not anticipated to impact any public service utilities.

Tall HVTLs can conflict with the safe operation of public and private airports and air strips. The Federal Aviation Administration (FAA) and MnDOT have each established development guidelines on the proximity of tall structures to public use airports. The FAA has also developed guidelines for the proximity of structures to Very-High-Frequency Omni-Directional Range (VOR) navigation systems.

The closest airport to the proposed route is the Grand Rapids/Itasca County Airport, which is located approximately seven miles away south of Grand Rapids. Due to the distance between the Grand Rapids/Itasca County Airport and the proposed route, construction and operation of the line and substation are not anticipated to impact safe operation and use of the airport.

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, services or transportation.

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.

No impacts to emergency services are anticipated. Minnesota Power would minimize potential impacts through coordination of the construction with local and state road authorities and use of signage during construction to alert drivers. No significant conflicts are anticipated.

5.12 Archaeological and Historic Resources

In September of 2013, Two Pines Resource Group, LLC (Two Pines) was contracted by Minnesota Power to complete a cultural resources literature search associated with the development of the HVTL Route Permit Application for the Canisteo transmission line project.[13] The purpose of the literature search was to determine if there were any previously recorded cultural resources within one mile of the proposed route that are listed in, or have been determined eligible for listing in, the National Register of Historic Places (NRHP).

Two Pines conducted background research at the State Historic Preservation Office (SHPO) in order to gather information on previously identified cultural resources within one mile of the proposed route. The study area encompasses portions of Township 56N Range 24W and Township 56N Range 25W in Itasca County.

One historic district, the Holman-Cliffs Iron Ore Mining Landscape Historic District (Holman-Cliffs Historic District), which is considered eligible for (CEF) listing in the National Register, is partially located within the study area. In the case of a property of this status, the SHPO and a federal agency have concurred that the resource is eligible for listing in the National Register, but a nomination form for the property has not yet been completed. For compliance purposes, the property is treated as if it is listed in the National Register.

The Holman-Cliffs Historic District is a cluster of landscape features associated with the mining operations of the Holman-Cliffs group of mines created between 1907 and 1958. The resources encompassed by the district include mines, associated stripping and lean ore dumps, the Village of Taconite, concentrator plant sites and associated dumps and tailings piles, segments of two railroads, and access roads. The proposed route passes within a half mile of the boundary of the Holman-Cliffs Historic District.

There are no locally-designated (Heritage Preservation Commission) historic properties present within the study area.

No resources on either the State Historic Site Network or the State Register of Historic Places list are present within the study area.

Two Pines found that four individual architecture-history properties have been previously inventoried within the study area (**Table 12**). Three of the four properties are contributing resources to the Holman-Cliffs Historic District, which is considered eligible for (CEF) listing in the National Register. The fourth property is the former site of the now razed Cleveland-Cliffs Concentrator Plant (IC-IRT-40). This potential archaeological site would be considered a

[13] RPA, Appendix D

contributing element to the district should an archaeological survey demonstrate that the site retains sufficient integrity; at this time the site of the Cleveland-Cliffs Concentrator Plant (IC-IRT-40) has not been formally evaluated for listing in the National Register.

Table 12. Previously Identified Archaeological/Historical Properties

Inventory Number	Name	T	R	S	Q	NRHP* Status
IC-IRT-037	Holman-Cliffs Mine Pit	56N	24W	21	SE-NE	Considered Eligible for Listing (CEF)
		56N	24W	22	S-NW	
IC-IRT-038	Mesaba-Cliffs Lean Ore Dump	56N	24W	16	S-SE	Considered Eligible for Listing (CEF)
IC-IRT-039	Mesaba-Cliffs Stripping Dump	56N	24W	21	NW-NE and NE-SE	Considered Eligible for Listing (CEF)
IC-IRT-040	Cleveland-Cliffs Concentrator Plant Site	56N	24W	21	NW-NE-SE	Considered Eligible for Listing (CEF), pending survey

* National Register of Historic Places

The proposed alignment has not undergone an archaeological survey. No archaeological sites or archaeological site leads have been previously recorded within one mile of the proposed route. Since the proposed alignment has not yet undergone an archaeological survey, there is a potential for unrecorded archaeological resources to be present within the anticipated ROW.

Potential Impacts

None of the recorded properties are located within the proposed route; it is unlikely that the Holman-Cliffs Iron Ore Mining landscape Historic District's historic character or its landscape and surroundings will be affected by construction of the transmission line.

The potential to impact any undiscovered archaeological site is low because the proposed route is located 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 route. 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 be required to carry out the appropriate field identification and 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 is 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.[14]

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

[14] 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.

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 (P.M. less than 2.5 microns or PM2.5) is generally small, or approximately 3 percent to 10 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.

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.[15]

[15] 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)

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.[16]

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.[17]

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.[18]

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 Mississippi River – Grand Rapids watershed, which covers 1,316,071 acres and contains 1,908 miles of stream/rivers and 552 lakes greater than 10 acres. The watershed drainage comprises parts of Aitkin, Carlton, Cass, Itasca, and St. Louis Counties. Some of the major cities are Grand Rapids, McGregor, Remer. Land use consists of 56 percent forested, 27 percent grass and wetland, 7 percent agricultural, 7 percent water, and 3 percent urban. The watershed has 4 nutrient-impaired lakes and 2 impaired stream-reaches. Nearly 89 percent of the land is privately owned; 4.76 percent is publicly owned. The watershed contains numerous heavily developed lakes. The majority of the lakes are important recreational resources and economic benefits to the watershed.

[16] Ibid
[17] 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)
[18] Ibid

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. There are no public water basins or FEMA floodplains located within the proposed route. There are numerous wetlands within the proposed route. There are also several water filled mines pits located to the north and south of the proposed route.

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 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 25**. Minnesota Power conducted a desktop review to verify the presence and classification of the wetlands present within the proposed Route.

Approximately 48 acres of wetland have been mapped within the proposed route and represent approximately 37 percent of the route. Hardwood swamps (29 percent), alder thicket/shrub-carr (22 percent), and shallow open water (22 percent) are the dominant wetland types within the route, followed by excavated ponds (16 percent), wet/sedge meadow (6 percent), and conifer swamp (5 percent).

Approximately 15.9 acres of wetland, including hardwood, conifer, and shrub swamps, have been mapped within the anticipated alignment/ROW, which represent approximately 23 percent of the ROW. The anticipated alignment requires thirteen wetland crossings ranging in length from 33 feet to 333 feet. Because the maximum span length for the transmission line is 600 feet, these wetlands will most likely be spanned.

Table 13. Wetlands Identified within the Proposed Route

Wetland Type	Wetland (acres)	
	ROW	Route
Alder thicket/Shrub carr	3.88	10.48
Conifer swamp	0.48	2.23
Excavated pond	2.47	7.70
Hardwood swamp	6.92	14.17
Shallow open water	2.29	10.65
Wet/sedge meadow	1.95	3.16
Excavated - Shrub carr	0.29	0.91
Total acres	**18.28**	**49.29**

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 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.

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.

The MnDNR Gap Analysis Program (GAP) Land Cover data set was used to identify land cover types in the vicinity of the project. GAP land cover types within the routes and proposed substation location are shown on Figure 24. Land cover is summarized in **Table 14**.

Table 14. Land Use/Land Cover within the 160 ft ROW

Landcover Type	Acres	Percent
Upland Shrub	68.48	32.0
Maple/Basswood	51.91	24.3
Aspen/White Birch	65.98	30.9
Developed	10.71	5.0
Grassland	6.94	1.8
Water	1.64	0.8
Spruce/Fir	1.64	0.8
Marsh	0.52	0.2
Lowland Shrub	3.17	1.5
Black Ash	5.77	2.7
Cropland	NA	0.0
Total	**213.77**	**100**

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.

Impacts to non-forested areas would be temporary and would primarily occur during construction of the proposed project. To minimize impacts to trees in the project area, the Applicants would limit tree clearing and removal to the transmission line ROW, areas that limit construction access to the project area, and areas that impact the safe operation of the facilities.

Trees outside the ROW that may need to be trimmed or removed would primarily include trees that are unstable and could potentially fall into the transmission facilities. The Applicant would work with and compensate landowners for removal of these trees.

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.

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, and 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. 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.

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.[19]

Forest fragmentation is a form of habitat fragmentation, and occurs when forests are cut down and leave relatively small, isolated patches of forest known as forest fragments or forest remnants. Forest fragmentation and the subsequent habitat fragmentation can decrease biodiversity.

Mitigative Measures

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

Displacement of fauna is anticipated to be minor and temporary in nature, and no long-term population-level impacts are anticipated from the proposed project. Minnesota Power has stated that it will construct the transmission line according to Avian Power Line Interaction Committee (APLIC) recommended safety design standards regarding avian collisions and avian electrocution with HVTLs. In addition, the Applicant would work with the MnDNR and the USFWS to identify any areas that may require marking transmission line shield wires and/or using alternative structures to reduce the likelihood of avian collisions. The HVTL Route Permit could include this consultation as a required permit condition.

Avoiding the use of photodegradable erosion-control materials where possible and using biodegradable materials (typically made from natural fibers) instead, 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.

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 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 manage 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 19.

The review of the NHIS database identified several state-listed species within the vicinity of the proposed route. These included Pale moonwort (Botrychium pallidum), Mingan moonwort (Botrychium minganense), Least moonwort (Botrychium simplex), and Matricary grapefern (Botrychium matricariifolium).

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 Itasca County. According to the website, one federally listed species is known to occur within the county: Canada lynx (*Lynx canadensis*).

The Canada lynx is federally listed as threatened and Critical Habitat is designated in Itasca 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. 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 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.

Minnesota Power has stated that it will submit a Rare Plant Survey Work Plan to the MnDNR for review and comment. The survey for rare plant species would be completed within the anticipated alignment and substation footprint area to determine the location of rare plants in accordance with the Survey Work Plan and modifications requested by the MnDNR, if any. The HVTL Route Permit could include this consultation and survey as a required permit condition.

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 approximately 4.5 miles in length and 160 feet wide) 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.[20] 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.

Many of the potential impacts associated with these factors are mitigated through standard industrial practices and requirements and general conditions contained within the HVTL Route Permit.

The applicable factors and corresponding elements that would be minimized through the application of standard industrial practices and requirements and general and special conditions contained within a HVTL Route permit are illustrated below.

[20] Minnesota Statute 216E.02

Factor	Element	Standard Practice	General/Special Route Permit Condition
Human Settlement	Noise	RPA pages 33-36 EA page 26	Appendix B, Sample HVTL Route Permit, Section 4.2.4
	Electronic Communications	RPA pages 36 and 37 EA pages 29	Appendix B, Sample HVTL Route Permit, Section 4.7.3
Public Health & Safety	Stray Voltage and Induced Voltage	RPA pages 30 EA pages 31	Appendix B, Sample HVTL Route Permit, Section 4.7.2
	Electric Fields	RPA page 25 EA pages 31	Appendix B, Sample HVTL Route Permit, Section 4.7.2
Land Based Economies	Agriculture, Forestry, Tourism, Mining	RPA pages 41-42 EA pages 40	Appendix B, Sample HVTL Route Permit, Section 4.2
Archaeological and Historic Resources		RPA pages 39 EA pages 45	Appendix B, Sample HVTL Route Permit, Section 4.29

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.

> Water Quality – With the implementation of Best Management Practices[21] 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.

[21] http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesotas-stormwater-manual.html

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 within the ROW will be thoroughly cleaned before moving to non-infested areas.[22]

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.[23]

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:

- 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.

[22] RPA at p. 5-6; EA at Section 5.13
[23] RPA at p. 5-5; EA at Section 5.13

Design Options – The proposed project is to accommodate Magnetation's expanding mining and mineral processing operation located west of the city of Bovey.[24] The range of potential routes and engineering designs considered by the Applicant for the proposed project was constrained by a need to connect to Magnetation's planned plant site and meeting Magnetation's load requirements, avoiding proposed mining activities and other energy projects permitted in the proposed project area.

Use of or Paralleling Existing ROWs - The proposed route is dictated and constrained to a large degree by several factors including: the location of Magnetation's operation, the location of ore bodies and iron formation stockpiles, and the location of available HVTLs to connect to.[25] As a consequence, opportunities to use of parallel existing ROWs are minimal.

Use of existing infrastructure ROWs - The proposed route is dictated and constrained to a large degree by several factors including: the location of Magnetation's operation, the location of ore bodies and iron formation stockpiles, and the location of available HVTLs to connect to. As a consequence, opportunities to use of parallel existing infrastructure ROWs are minimal.[26]

Route and Design Dependent Costs - Minnesota Power estimates that the project, which includes the installation of two new 115 kV HVTL and construction of a new substation, will cost approximately $6 million. Operation and maintenance costs for the HVTL are estimated to be $600 per mile.[27] In developing its proposed route, Minnesota Power evaluated and rejected an alternative HVTL route that would connect to the Diamond Lake Tap, originating north east of Taconite.[28] This route was rejected due to its reliability issues, greater length and cost, and conflicts with other proposed projects.

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.).

[24] RPA, at p.9; EA at Section 3.0
[25] RPA at Section 3.0; EA at Section 3.0
[26] Id
[27] RPA at p. 3-2; EA at Section 3.0
[28] RPA, Section 4.3; EA Figure 18

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 (palustrine forested [PFO] to palustrine scrub-shrub [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