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Abstract

Northern States Power Company d/b/a Xcel Energy and the city of Glencoe submitted an application to the Minnesota Public Utilities Commission for a Certificate of Need (CON) to construct approximately 2 miles of new 69 kV transmission line, 6 miles of new 115 kV transmission line, and to upgrade approximately 20 miles of 69 kV transmission line to 115 kV capacity near the cities of Glencoe, Norwood Young America, and Waconia along with certain substation modifications located in the southwest metro area of the Twin Cities. The CON application includes approximately 28 miles of transmission line.

Xcel Energy submitted an application to the Minnesota Public Utilities Commission for a High Voltage Transmission Line (HVTL) Route Permit to construct approximately 0.9 mile of new 115 kilovolt (kV) transmission line, 1.9 miles of new 69 kV transmission line that is capable of operating as 115/69 kV double circuit line and upgrade approximately 20 miles of 69 kV transmission line to 115 kV or double circuit 115/69 kV capacity near the cities of Glencoe, Plato, Norwood Young America and Waconia located southwest of the Twin Cities metro area. The route permit application covers approximately 23 miles of transmission line and certain substation modifications.

Two separate approvals from the Minnesota Public Utilities Commission are required for the construction/operation of the Glencoe – Waconia 115 kV transmission line project – a certificate of need (CON) and a route permit. The Applicants submitted a CON application to the Commission on November 30, 2010. The application was accepted as complete by the Commission on January 27, 2011. Xcel Energy submitted a route permit application to the Commission on December 10, 2010. The route permit application was accepted as complete by the Commission on January 14, 2011.

The Energy Facility Permitting staff of the Department of Commerce has elected to combine its environmental review responsibilities under the Certificate of Need process with the environmental review procedures under the HVTL Route Permit procedures (Minnesota Rule 7849.1900, Subpart 1). The result is a single environmental review document, an Environmental Assessment.

The environmental assessment addresses the issues required in Minnesota Rules 7849.1500, subpart 1 and Minnesota Rules, 7850.3700, subpart 4, and as determined in the Scoping Decision of April 1, 2011.

Persons interested in these matters can register their names on the Project Docket webpage at http://energyfacilities.puc.state.mn.us/Docket.html?Id=30371 or by contacting Bill Storm, Energy Facilities Permitting, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone (651) 296-9535, e-mail: bill.storm@state.mn.us. Documents of interest can be found at the above website or by going to https://www.edockets.state.mn.us/EFiling/search.jsp and entering "09" and "1390" for the CON docket and "10" and "249" for the HVTL Route docket as the year and project identification search criteria.

Following the release of this Environmental Assessment, a Public Hearing will be held in the project area.

Acronyms, Abbreviations and Definitions

ACSS	Aluminum Conductor Steel Supported
AC	Alternate Current
ALJ	Administrative Law Judge
BMP	best management practice
BPA	Bonneville Power Association
CEF	Considered Eligible Findings
CMMPA	Central Minnesota Municipal Power Agency
COE	Corps of Engineers
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
CSAH	County State Aid Highway
dB	decibels
dBA	A-weighted sound level recorded in units of decibels
d/b/a	doing business as
DC	Direct Current
DG	Distributed Generation
DNR	Department of Natural Resources
DOC	Department of Commerce
EA	Environmental Assessment
EFP	Department of Commerce Energy Facilities Permitting
EMF	electromagnetic field
EPA	United States Environmental Protection Agency
ER	Environmental Report
FEMA	Federal Emergency Management Agency
G	Gauss
GRE	Great River Energy
HVTL	high voltage transmission line
Hz	Hertz
kV	kilovolt
kV/M	Kilovolt per meter
kWh	Kilowatt hour
mA	milliAmperes
MCBS	Minnesota County Biological Survey
MDH	Minnesota Department of Health
mG	milligauss
MHz	Mega Hertz
mg/L	milligrams per liter – equivalent to parts per million (ppm)
Mn DNR	Minnesota Department of Natural Resources
Mn DOT	Minnesota Department of Transportation
MOU	memorandum of understanding

MPCA	Minnesota Pollution Control Agency
MSIWG	Minnesota State Interagency Working Group
MW	Mega Watt
NAC	noise area classification
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEV	Neutral-to-Earth Voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PM	Particulate Matter
ppm	parts per million
PUC	Public Utilities Commission
PWI	Public Waters Inventory
RAPID	U.S. EMF Research and Public Information Dissemination
ROW	Right-of-Way
RUS	Rural Utilities Service
SFD	Swan Flight Diverter
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
USCOE	United States Corp of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCA	Minnesota Wetland Conservation Act
WHO	World Health Organization
WPA	Waterfowl Production Area
WMA	Wildlife Management Area
WPSC	Wisconsin Public Service Commission
WSR	Wild and Scenic River

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APPENDICES

Appendix A. EA Scoping Decision
Appendix B. Sample HVTL Route Permit

1.0 Introduction

Xcel Energy and the city of Glencoe (Applicants) have made a joint application to the Minnesota Public Utilities Commission (Commission) for a Certificate of Need (CON) for the construction of the 115 kV transmission line upgrades to the Glencoe – Waconia 69 kV system pursuant to Minnesota Statute Section 216B.243 and Minnesota Rules 7849.0020 – 7849.0400.

Xcel Energy made an application to the Commission for a HVTL Route Permit for the construction of the Glencoe – Waconia project pursuant to Minnesota Statutes Section 216E and Minnesota Rules Chapter 7850.

The Energy Facility Permitting (EFP) staff is tasked with conducting environmental review on applications for certificate of need and 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 for the proposed project and its alternatives.

This document meets the environmental review requirements of both the certificate of need procedures and the HVTL route permit process by a) providing information in Section 2 on the regulatory framework, certificate of need and route permit processes; b) describing in Section 3 the proposed project, alternatives means of meeting the stated need, and alternatives to the proposed route; c) summarizing in Section 4 the potential effects on people and the environment of the proposed route and the route alternatives; d) analyzing alternatives to the proposed HVTL; and e) assessing in Section 5 the feasibility of the proposed project and the alternatives.

1.1 Project Description

The project is located in McLeod and Carver counties, near the cities of Glencoe, Plato, Norwood Young America, and Cologne (**Figure 1**). The project consists of approximately 0.9 mile of new 115 kilovolt (kV) transmission line, 1.9 miles of new 69 kV transmission line that is capable of operating as 115/69 kV double circuit line and upgrade approximately 20.2 miles of 69 kV transmission line to 115 kV (double circuit 115/69 kV capacity) near the cities of Glencoe, Plato, Norwood Young America and Waconia located southwest of the Twin Cities metro area. The project is approximately 28 miles in total (**Figure 2**).

The Applicants propose to construct the following facilities:

- Construct a new 115 kV Diamond Substation in Glencoe and approximately 5 miles of new 115 kV transmission line between the existing Armstrong Substation and the new Diamond Substation (While this portion of the project is included in the certificate of need proceedings, the final route will be determined and permitted through the local review process of Minnesota Rules 7850.5300).
- Upgrade approximately 4 miles of 69 kV transmission line to 115/69 kV double circuit from the proposed Diamond Substation to the existing Plato Substation.

- Expand the existing Plato Substation to upgrade the 69 kV distribution load to 115 kV, and to install a capacitor bank on the 69 kV transmission line.
- Upgrade approximately 10 miles of 69 kV transmission line to 115 kV capacity between the Plato Substation, the Young America Substation and the West Waconia Substation.
- Construct approximately 1 mile of new 115 kV transmission line along Highway 5 on the west side of the city of Norwood Young America. This new segment is needed to avoid having to build the 115 kV line into the developed areas of Norwood Young America.
- Upgrade approximately 1 mile of existing 69 kV transmission to 115 kV from the existing West Waconia Substation along Highway 5.
- Construct approximately 2 miles of new 69 kV transmission line from Highway 5 to the existing Augusta 69 kV transmission line. This section would be built to double circuit standard to accommodate a future 115 kV transmission line along with the proposed 69 kV line.
- Upgrade approximately 7 miles of existing 69 kV transmission line to 115 kV capacity from the Waconia Tap to just short of the Augusta Substation.

1.2 Project Location

The western end of the project area is located in Helen Township, McLeod County, at the location of the city of Glencoe's proposed Diamond Substation. From there, the project area extends to the east into and across Norwood Young America, Waconia, Benton, and Dahlgren townships in Carver County terminating on the west side of Aue Lake which is located 1.25 miles west of the Augusta Substation.

Table 1 below summarizes the proposed project location.

Table 1. Project Location

County/Township/City	PLS Township (N)	PLS Range (W)	PLS Sections
McLeod / Helen	115	27	1, 2, 8-11, 15-17
Carver / Young America	115	26	1, 2, 4-6, 9-11
Carver / City of Norwood Young America	NA	NA	NA
Carver / Waconia	116	25	31-33
Carver / Benton	115	25	1-12
Carver / Dahlgren	115	24	4-9

1.3 Project Purpose

The need for the project was first identified in the *Glencoe Area Transmission Study*, (Study) conducted in 2002. That study identified the need for a 115 kV transmission line in the McLeod – Glencoe – West Waconia area. The first phase, the McLeod – Glencoe segment was placed in service in 2006. The current HVTL Route Permit Application addresses the second phase of the plan, which is the Glencoe – West Waconia segment. The Glencoe – West Waconia segment is designed to maintain reliable service to the city of Glencoe during loss of the McLeod – Glencoe line.

The Applicants state that without the Glencoe – West Waconia line, under certain conditions customer equipment such as process controls, motor drive controls and automated machines, could be damaged due to low voltages. Depending on the duration of a low voltage condition, equipment such as electronic power supplies could also malfunction or fail when output voltage drops below certain levels. Without the proposed transmission upgrades, low voltage conditions will worsen as the area experiences continued growth and development.

The Study included an updated analysis specific to the Glencoe – Waconia area in September 2009, which identified additional system deficiencies in the study area. At times when other transmission lines were out of service, several overloading and low voltage conditions were identified. The Study focused on two regions including Scott County Substation to Carver County Substation and Carver County Substation to Glencoe Substation.

The Study found that in the Scott County Substation – Carver County Substation area, if either the 1 or 2 transformers at the Scott County Substation is out of service, the remaining transformer will overload. With an outage of the Scott County – Chaska 69 kV transmission line, low voltage conditions arise at the city of Chaska and on the Carver County – Augusta transmission line. In the Carver County Substation–Glencoe Substation area, potential low voltage conditions may occur during the outage of St. Bonifacius – Dickinson 115 kV transmission line and numerous low Glencoe – Waconia voltages occur when city of Glencoe is served from the 69 kV system during the loss of the Glencoe – McLeod 115 kV line.

The most recent forecast provided by Central Minnesota Municipal Power Agency (CMMPA) for the city of Glencoe indicates that the peak load would be around 20.8 MW in 2015 as opposed to 26.4 MW used in the Study. Historic peaks loads in the city of Glencoe were of 25.8 MW in 2003 and 24 MW in 2006, therefore the loads modeled in the Study are rather conservative. Even with the 20.8 MW of load as forecasted by CMMPA, the voltages at the city of Glencoe and High Island substations would be around 92 percent of the design voltage. Since this is close to being a low voltage violation (and the load for the city of Glencoe has shown the potential to be higher), combined with the age and condition of the existing 69 kV line, the new forecast provided by CMMPA does not impact the need for the project.

1.4 Sources of Information

Much of the information used in this Environmental Assessment is derived from documents prepared by Xcel Energy. These include the Certificate of Need Application, November 30, 2010, and the HVTL Route Permit Application, December 10, 2010 Discussion of Electromagnetic Field (EMF) issues came primarily from the white paper developed by the Interagency Task Force led by the Minnesota Health Department, the National Institute for Environmental Health and the World Health Organization. Additional information comes from earlier Energy Facility Permitting environmental review documents in similar dockets, other state agencies, such as the Department of Natural Resources, and additional research. First hand information was gathered by site visits along the proposed line.

2.0 Regulatory Framework

In Minnesota, most high voltage transmission line projects go through a two stage regulatory process. First, application is made to the Minnesota Public Utilities Commission for a Certificate of Need (CON). If a CON is granted, the utility must then obtain a Route Permit from the Commission that designates a specific route for the line.

2.1 Certificate of Need

Before any large HVTL can be constructed in Minnesota, the Commission must determine that they are necessary and in the best interest of the state. The certificate of need process includes environmental review and public hearings, and typically takes 12 months. This process is the only proceeding in which a no-build alternative and the size, type, timing, system configuration and voltage of the proposed project will be considered.

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

http://energyfacilities.puc.state.mn.us/Docket.html?Id=30556

The Energy Facility Permitting staff is responsible for administering the environmental review process. The Commission is responsible for determining if the transmission lines proposed are needed.

Potential routes that the transmission lines would follow, if approved, are put forth and evaluated in the HVTL route permit proceeding (See Below). The transmission line routes will be determined through the HVTL route permit process, which is proceeding concurrently with the certificate of need process.

Environmental Review
The environmental review process under the certificate of need procedures includes public information/scoping meetings and the preparation of an environmental review document, the Environmental Report (ER). The environmental report is a written document that describes the human and environmental impacts of the proposed project, alternatives to the project and methods to mitigate anticipated adverse impacts. The ER must be prepared before the Commission can make a decision on the certificate of need application.

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.

Xcel Energy submitted the HVTL route permit application for the proposed transmission line upgrades to the 69 kV Glencoe to Waconia system pursuant to the provisions of the Alternative Permitting Process outlined in Minnesota Rules 7849.2900. The alternative permitting process includes environmental review and public hearings, and typically takes six months.

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

http://energyfacilities.puc.state.mn.us/Docket.html?Id=30371

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

Environmental Review

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

The 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 Combining Processes

Minnesota Rule 7849.1900, Subpart 1, provides that in the event an applicant for a certificate of need for a HVTL applies to the Commission for a HVTL route permit prior to the time the EFP staff completes the environmental report, the Department may elect to prepare an environmental assessment in lieu of the required environmental report. If the documents are combined, EFP staff includes in the EA the analysis of alternatives required by part 7849.1500, but is not required to prepare an environmental report under part 7849.1200.

As two concurrent environmental reviews are required – one for the CON application and one for the route permit application – Department staff elected to combine the environmental review for the two applications (Minn. Rules 7849.1900). Thus, this environmental assessment (EA) has been prepared to meet the requirements of both review processes.

2.4 Scoping Process

On February 1, 2011, the EFP staff sent notice of the place, date and times of the Initial Public Information and Scoping meeting to those persons on the General List, the agency technical representatives list and the project contact list. Additionally, on February 4, 2011, Xcel Energy mailed the notice to those persons on their property owners list and local unit of government list. Notice of the public meeting was also published in the local newspapers.

On Tuesday, March 1, 2011, the Energy Facility Permitting staff held two public information/scoping meetings at the Clay Community Building in Norwood Young America. The meetings included two sessions, one starting at 2:00 p.m. and another starting at 6:00 p.m. 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 that should be considered during preparation of the environmental review document. Written comments were due no later than Wednesday, March 23, 2011.

Approximately 35 people attended the public information and scoping meetings; 13 individuals took the opportunity to speak on the record. A court reporter was present to document oral statements. Ten written comments were received.

A variety of questions were asked and answered during the oral discussion; topics included: specifics on which lines and poles will be removed, and design/construction of any new poles; specifics on the proposed alignment; the concepts of route width and right-of-way (ROW) width; sources of power generation for this project; and timeline and milestones of the application review process.

The major areas of concern for scoping expressed during the public comment period included: health and safety issues, property values, compensation for easements, and flexibility in siting the final alignment.

Alternative routes, alternative route segments and modifications to the Xcel Energy's proposed alignment were also discussed during the scoping meeting and in comments received during the scoping comment period.

There was no Advisory Task Force established for this routing docket.

After consideration of the public comments, the Commissioner issued his Scoping Decision on April 1, 2011. A copy of this order is attached in the **Appendix A**. These items and issues, along with the typical HVTL routing impacts, were incorporated into the Scoping 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. The route permit will contain conditions specifying construction and system operation standards (see a sample Route Permit in **Appendix B**).

2.5 Public Hearing

The Commission is required by Minn. Rule 7849.5710 subp 1, to hold a public hearing once the EA has been completed. It is anticipated that this hearing will be held in late August, 2011, in the project area, and will be conducted by an Administrative Law Judge (ALJ). The hearing will be noticed separately and details can be found online at

http://energyfacilities.puc.state.mn.us/Docket.html?Id=30371. 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 EFP with a summary of testimony from the hearing.

Comments received on the Environmental Assessment become part of the record in the proceeding, but EFP staff is not required to revise or supplement the EA document. A final decision on a route permit will be made by the Commission at an open meeting within a couple of months after the public hearing, depending on scheduling opportunities. The process anticipates a decision within six months of the Application.

If issued a certificate of need and route permit by the Commission, Xcel Energy 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.

2.6 Local Review

For certain projects, an applicant can elect to seek route/site permitting authorization from local units of government rather than from the Commission (Minnesota Statute 216E.05). Qualifying projects include the following:

- large electric power generating plants with a capacity of less than 80 megawatts;
- large electric power generating plants of any size that burn natural gas and are intended to be a peaking plant;
- high-voltage transmission lines of between 100 and 200 kilovolts;
- substations with a voltage designed for and capable of operation at a nominal voltage of 100 kilovolts or more;
- a high-voltage transmission line service extension to a single customer between 200 and 300 kilovolts and less than ten miles in length; and
- a high-voltage transmission line rerouting to serve the demand of a single customer when the rerouted line will be located at least 80 percent on property owned or controlled by the customer or the owner of the transmission line.

Within ten days of submission of an application to a local unit of government for approval of an eligible project, the applicant must notify the commission that the applicant has elected to seek local approval of the proposed project.

The approximately 4.5 mile portion of new 115 kV transmission line from the existing Armstrong Substation to the site of the new 115 kV Diamond Substation, as well as the Diamond Substation will be built and owned by the city of Glencoe Power and Light Commission; while

this portion of the project is included in the certificate of need proceedings, the final route will be determined and permitted through the local review process of Minnesota Rules 7850.5300.

A listing of local review projects can be found on the Commission's website at:

http://energyfacilities.puc.state.mn.us/Docket.html?Id=3855

2.7 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 supplementary permits that may be required for Xcel Energy to complete this project.

Table 2. Potential Required Permits

Permit	Jurisdiction
Route Permit	MnPUC
Certificate of Need	MnPUC
Clean Waters Act Section 404 Permit	USCOE
Public Waters	MnDNR
Utility Permit	MnDOT
Construction Stormwater Permit	MPCA
Minnesota Wetland Conservation Act Certification	Carver and McLeod Counties
County Road Access Permit	Carver and McLeod Counties

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 Applicants are still required to obtain relevant permissions, such as road crossing permits.

2.8 Applicable Codes

The transmission line, regardless of route location, must meet all requirements of the National Electrical Safety Code (NESC) and the Rural Utilities Service (RUS) Design Manual 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 RUS 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.

2.9 Issues Outside the Scope of the EA

The EA will also not consider the following:

- Any route or substation 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 McLeod and Carver counties near the cities of Glencoe, Plato, Norwood Young America and Waconia located southwest of the Twin Cities metro area.

The certificate of need (CON) application submitted by Xcel Energy and the city of Glencoe Power and Light Commission seeks approval to construct two miles of new 69 kV transmission line, six miles of new 115 kV transmission line, and to upgrade approximately 20 miles of 69 kV transmission line to 115 kV capacity, along with the construction of a new substation and certain substation modifications. The CON application includes approximately 28 miles of transmission line.

Xcel Energy's route permit application requests approval to construct approximately 0.9 miles of new 115 kilovolt (kV) transmission line, 1.9 miles of new 69 kV transmission line that is capable of operating as 115/69 kV double circuit line and upgrade approximately 20.2 miles of 69 kV transmission line to 115 kV (double circuit 115/69 kV capacity). The route permit application covers approximately 23 miles of transmission line and certain substation modifications.

3.1 Project Segments

The proposed Glencoe-Waconia transmission line project measures approximately 28 miles in length. The HVTL Route Permit Application covers the approximately 23 miles of transmission line that will be constructed, owned and operated by Xcel Energy; this portion of the project is divided into seven segments. The reminder of the project will be constructed, owned and operated by the Glencoe Power and Light Commission.

Figures 3 through 10 illustrate the proposed HVTL on aerial photographs.

City of Glencoe Power and Light Commission Segment
This segment includes approximately 4.5 miles of new 115 kV transmission line from the existing Armstrong Substation to the site of the new 115 kV Diamond Substation, as well as the Diamond Substation. This portion of the project will be built and owned by the city of Glencoe Power and Light Commission and while this portion is included in the certificate of need proceedings, the final route will be determined and permitted through the local review process of Minnesota Rules 7850.5300.

The proposed route for this segment begins at the existing Armstrong Substation located on Armstrong Avenue and 11th Street East. The HVTL line will exit the Armstrong Substation and run south along the west side of Armstrong Avenue following an existing distribution line. The HVTL will follow the existing distribution line until it intersects with the north ROW of US Trunk Highway 212. From here the HVTL will follow the north ROW of US Trunk Highway 212 east for approximately 9,500 feet. In the vicinity of Russell Avenue, the HVTL will cross US Trunk Highway 212 and continue east along the south ROW of US Trunk Highway 212 for approximately 12,500 feet to the intersection with Diamond Avenue. The HVTL will turn north

along the west side of Diamond Avenue for approximately 3,500 feet, where it will turn west and terminate at the site of the new Diamond Substation.

Segment 1
Rebuild approximately 3.6 miles of existing 69 kV transmission line (Line #0771) to a 115/69 kV double circuit transmission line between the city of Glencoe's new Diamond Substation and the Plato Substation located north of the town of Plato, just west of the intersection of 122nd Street and County Highway 9. This route will begin at the Diamond Substation and proceed 2.1 miles along the south side of 110th Street, crossing Dairy Avenue at the 0.05 mile mark. It proceeds northeast along the west side of Boone Avenue, crossing to the east side at an unnamed tributary to Buffalo Creek. As Boone Avenue turns north, the line continues northeast across agricultural land to the Plato Substation, which will be slightly relocated 250 to 500 feet southwest of the existing substation.

Segment 2
Rebuild approximately 6.4 miles of existing 69 kV transmission line (Line #0771) to a 115 kV transmission line between the Plato Substation to the intersection of State Highway 25/5 and County Highway 34. This route proceeds east from the substation along the north side of McLeod County Road 3 (122nd Street), which becomes Carver County Road 34. The route crosses to the south side of County Road 3 at Zebra Avenue and continues east on the south side of the county road. At Urban Avenue, the route deviates south from County Road 34 right of way, crossing agricultural land and a farmstead. The route crosses to the north side of County Road 34 approximately 500 feet east of County Road 33 and continues to Highway 25/5.

Segment 3
Construct approximately 0.9 miles of new 115 kV transmission line along State Highway 25/5 between the intersection of State Highway 25/5 and County Highway 34 and the intersection of State Highway 25/5 and 5th Avenue NE, located on the northeast side of Norwood Young America. This route will be aligned along the north side of the roadway for all but the easternmost 500 feet, which crosses to the south side of Highway 25/5.

Segment 3a
The existing 69 kV line (Line #0735) extending from the intersection of Highway 25/5 and County Road 34 to the Young America Substation will be deconstructed. This route is located approximately one-half block north of and parallels First Street Northwest.

Segment 3b
The existing 69 kV line extending along Fifth Avenue northward from 118th Avenue to the southeast quadrant of the intersection of Highway 25/5 will be deconstructed. This 0.3 mile line crosses from the west side of Fifth Avenue to the east side immediately north of 118th Avenue.

Segment 4
Rebuild approximately 3.2 miles of existing 69 kV transmission line (Line #0735) to a 115 kV transmission line between the intersection of State Highway 25/5 and 5th Avenue and

intersection of State Highway 5 and County Road 51. This route extends from the southeast quadrant of Highway 25/5 and 5th Avenue northeastward on the south side of the highway.

Segment 4.5
Construct approximately 150 feet of new 115 kV transmission line from Segments 4 into, and out of the existing West Waconia Substation. This route will be on the south side of Highway 5.

Segment 5
Rebuild approximately 1.0 mile of existing 69 kV transmission line (Line #0735) to a 115 kV transmission line between the West Waconia Substation and the intersection of Highway 5 and County Road 51. This route extends from the substation northeastward on the south side of the Highway 5.

Segment 5a
Construct 0.7 miles of new double circuit 69/115 kV from Waconia West Substation along 106th Street to County Road 51. This route would deviate from Highway 5 and proceed east on the southern side of 106th Street.

Segment 6
Construct approximately 1.9 miles of new 115/69 kV double circuit transmission line along County Highway 51 between Highway 5 and the existing Xcel Energy 69 kV (Line #0740). The route of this segment could include either the east or west side of County Highway 51. This segment will be initially operated at 69 kV.

Segment 7
Rebuild approximately 7 miles of existing 69 kV transmission line (Line #0740) to a 115 kV transmission line between intersection of County Highway 51 and line #0740 and Structure #142 on the west side of Aue Lake. The route proceeds east from County Highway 51 through agricultural land and around the south end of Winkler Lake. East of Winkler Lake, the route continues along the south side of County Road 153. The route continues easterly as County Road 153 turns north, proceeding past the north edge of Miller Lake to the eastern termination of the project. This segment will be initially operated at 69 kV.

3.2 Right-of-Way Requirements

The Applicants are requesting a right-of-way (ROW) width up to 75 feet wide. Applicants, however, would rebuild the transmission lines for the project within the existing 50-foot right-of-way wherever reasonably possible. When the line is parallel to a roadway, poles would generally be placed approximately five feet outside the public right-of-way. Therefore, a little less than half of the line right-of-way would share the existing road right-of-way, resulting in an easement of lesser width required from the landowner.

Approximately 1.9 miles of new right-of-way will need to be acquired along County Highway 51 to construct Segment 6. Segment 6 involves construction of a new 69 kV transmission line

which will be constructed to be 115/69 kV double circuit capable. The route of this segment between Highway 5 and the existing Xcel Energy 69 kV line 0740 could be aligned along either the east or west side of County Highway 51.

Approximately 0.9 mile of new right-of-way will also need to be acquired along Highway 25/5 to allow the new 115 kV line to bypass the Young America Substation (Segment 3). This route will follow the northwest side of Highway 25/5.

For the proposed project, approximately 17.8 miles of the 23 miles (77 percent) will be parallel to existing roadways, and approximately 5.23 miles (23 percent) will be cross-country transmission lines.

Figures 11 and 12 illustrate the pole dimensions and general ROW requirements.

Right-of-Way Acquisition

Because Applicants intend to rebuild the transmission line within the existing 50-foot right-of-way, the need for new right-of-way acquisition would be limited. All existing easements would be evaluated to determine if the project can be built without obtaining additional land rights. If an easement would accommodate the project, the right-of-way agent would still work with the landowner in order to address any construction needs, impacts, damages, or restoration issues. To the extent new right-of-way acquisition is necessary; the evaluation and acquisition process would include title examination, initial owner contacts, survey work, document preparation and purchase. Most of the time, utilities are able to work with the landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights.

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

Table 3. Summary of Transmission Structures

Line Type	Structure Type	Structure Material	Right-of-Way Width (feet)	Structure Height (feet)	Structure Base	Span Between Structures (feet)
115 kV Single Circuit	Single pole, horizontal braced post insulator	Weathering Steel	75	60-80	Direct Embedded for tangents and self-supporting for angle structures/dead-end structures	300-400

Line Type	Structure Type	Structure Material	Right-of-Way Width (feet)	Structure Height (feet)	Structure Base	Span Between Structures (feet)
69/115 kV Double Circuit	Single Pole, Davit Arm	Weathering Steel	75	75-105	Direct embedded for tangents and self-supporting for angle/dead-end and switch structures	300-400

3.3 Project Construction and Maintenance

Steel poles with horizontal braced post insulators are proposed to be used for the 115 kV single circuit transmission lines. Steel poles with davit arms are proposed for the 69/115 kV double circuit transmission line (see **Table 3** above). Direct embedded weathering steel poles with davit arms are proposed to be used for the tangent structures if soil conditions warrant. Rock-filled culvert foundations may be required in areas with poor soils. Self-supporting weathering steel poles with davit arms on drilled pier concrete foundations are proposed to be used for all long span, angle and dead-end structures.

Pictures of the proposed structure types are shown below in **Figure 13.**

The steel structures will be approximately 60 to 105 feet tall with spans of approximately 300 to 400 feet to keep the conductor within existing rights-of-way where applicable. The proposed transmission line will be designed to meet or surpass relevant local and state codes including the National Electric Safety Code (NESC), North American Electric Reliability Corporation (NERC) and Company standards. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.

The 115 kV conductor proposed for the project will be 795 kcmil 26/7 Aluminum Core Steel Supported (ACSS). The 69 kV conductor proposed for the project will be 477 kcmil 26/7 Aluminum Conductor Steel Reinforced (ACSR).

Construction

Construction would begin after federal, state and local approvals are obtained, property and rights-of-way are acquired, soil conditions are established and design is completed. The precise timing of construction would take into account various requirements that may be in place due to permit conditions, system loading issues, available workforce and materials. Actual construction would follow standard construction and mitigation practices, addressing right-of-way clearance, staging, erecting transmission line structures and stringing transmission lines. Construction and mitigation practices to minimize impacts would be based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain and

other practices. Some construction restrictions and requirements will be reviewed in discussion concerning mitigation later in this document.

Maintenance

The principal operating and maintenance cost for transmission facilities is the cost of inspections, usually done monthly by air. Annual operating and maintenance costs for transmission lines in Minnesota and the surrounding states vary. However, past experience shows that for voltages from 69 kV through 345 kV, costs are approximately $300 to $500 per mile. 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.

3.4 Project Implementation

The Applicants anticipate a late 2012 in-service date. Construction would be expected to begin in mid 2011. 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 transmission line and substation improvements would cost approximately $29 million, as outlined below on **Table 4**.

Table 4. Project Costs

Year In-Service	Facility	Cost
	Xcel Energy Upgrades	
2012	Transmission Line Facilities	$22,200,000
2012	Substation Facilities	$ 3,400,000
	Total Xcel Energy Cost Estimate	$25,600,000
	City of Glencoe Upgrades	
2012	Transmission Line Facilities	$1,900,000
2012	Substation Facilities	$1,500,000
	Total City of Glencoe Upgrades	$3,400,000
2012	**Grand Total (Xcel Energy & City of Glencoe)**	$29,000,000

4.0 Alternatives to the Proposed Project

In addition to need, the CON process reviews possible alternatives to the proposed project that may be able to fill that need. A general description of these alternatives is required per Minn. R. 7849.1500, Subp. 1 (B). The requirements of this rule include an investigation into the feasibility of the following alternatives:

- The no-build alternative,
- Demand side management,
- Purchased power,
- Facilities of a different size or using a different energy source than the source proposed by the applicant,
- Generation rather than transmission,
- Renewable energy sources

The following section discusses the feasibility and availability of potential alternatives to the transmission line which could eliminate the need for the proposed project. None were found to be a feasible alternative to the proposed project.

4.1 No Build Alternative

Under the no build alternative none of the existing structures would be replaced and the transmission line would continue to be operated at 69 kV. There would be no construction of the new Diamond substation, nor would improvement to the existing substations be completed.

Under this alternative, peak-demand periods could result in localized voltage collapse or damage to equipment. The Applicants state they would need several hours to restore electric service to customers in the area under such a scenario, and once service was restored the company may need to institute rotating blackouts to insure that voltage would not collapse again. Furthermore, it is likely that there would be a negative effect on the local economy due to the unreliable electrical service in the area.

Without the project, low voltage and overloading conditions will arise throughout the study region after 2011. The project addresses the pending low voltage and overload conditions discovered in the Study. Failure to upgrade the Glencoe –Waconia transmission line to 115 kV capacity could result in NERC violations in the future due to low voltages at St. Bonifacius and Waconia.

Additional load growth in the area will not be possible after 2011 if the upgrades and new segments of transmission line are not constructed. If growth continues without the project, load shedding could be required. The voltage and Glencoe – Waconia loading problems confronting the Glencoe – Waconia – Chaska load area demonstrate that a no-facility alternative is not a feasible option.

Delaying the project could result in the city of Glencoe being required to run the city's generators during transmission outages on McLeod – Glencoe 115 kV line, as the existing 69 kV system would experience low voltages when serving the entire load of the city. The cities of Plato and Norwood Young America will continue to experience momentary and sustained outages due to the poor reliability of the aging line. The 115 kV system around Waconia could experience low voltages during transmission outages posing a possible NERC standard violation in the future without St. Bonifacius generation. In addition, load at Chaska, Victoria and Augusta would be at risk of load shedding due to thermal and voltage limitations on transmission facilities in the area.

This is not a feasible alternative. This alternative does not address the voltage support issues that are being experienced in the area. Under this alternative it is likely that there would be an unacceptable negative effect on the local economy due to the unreliable electrical service in the area.

4.2 Conservation alternative

This alternative would seek to address the need of 36-87 MW with Demand Side Management. The alternative would use a slate of energy conservation measures that would ultimately reduce load in the area to a level allowing the current system to operate in a reliable manner. This conservation effort would most likely be phased in, and would be above and beyond the companies' current efforts. In addition, any load growth occurring in the area would also need to be met through aggressive conservation effort.

Xcel Energy has obtained significant energy savings from various conservations programs, including the Conservation Improvement Program (CIP) as required by Minnesota Statutes 216B.241. While the company anticipates futures savings from the continuation of these efforts, conservation alone will not be sufficient to address the significant reliability issue that exists in the area.

Glencoe Power and Light Commission's goal has been to work with its customers in an attempt to reduce energy consumption within the system by 1.5 percent. In the first half of 2010, 67 of Glencoe Power and Light Commission's customers have received $9,869.60 in rebates which will save a total of 267,266 kWh of electricity annually. The city also has 2 customers that they have been working with looking at very large projects; these projects are still pending, but will potentially see a reduction of 750,000 kWh.

In comments on the Certificate of Need Application, Department analyst Dr. Steve Rakow states the following:

> *Based upon this information, the Department concludes that energy conservation is not a good option for providing the load reduction needed in place of the Proposed Project because:*

1. The load reduction is too large to be able to be obtained through energy conservation projects in a small geographic area. In other words, demand reductions in Glencoe may not help alleviate the overloading in the Chaska area.

2. The load reduction is needed almost immediately. Even if energy conservation over time could provide the load reduction, it would not be able to provide it in a timely manner.

Thus, while energy conservation is an effective alternative for meeting future needs, it will not be able to address issues related to meeting existing demand at the levels indicated above. In summary, the required load reductions are too large, in too small an area, and required to be in place too soon for conservation to be a reasonable alternative.

This is not a feasible alternative given that an unrealistic amount of conservation would have to be achieved in the project area to meet the needs that would otherwise be met by the proposed project.

4.3 Purchased Power

Another alternative generally reviewed in a Certificate of Need case is whether the Applicants could purchase power to meet the increased load growth in the area. Typically, this would be more relevant in a power plant application. In this transmission application, purchased power would not solve any system inadequacies in the area. Power, produced or purchased, would have to be transferred and delivered along an arguably inadequate transmission system.

This is not a feasible alternative as there would still be voltage support issues in the area and it is likely that Xcel Energy would have to upgrade the transmission line in order to deliver purchased power to the area.

4.4 Facilities of a Different Size or Type

Size in the context of the certificate of need application refers to the quantity of power transfers that the transmission infrastructure improvements enable, while type refers to the transformer nominal voltages, rated capacity, surge impedance loading, and nature (AC or DC) of power transported.

Transmission lines of other voltages will not serve the need for this area; 69 kV lines will not meet the future load growth needs in the area; 161 kV lines would require new 115/161 kV transformers at Glencoe and West Waconia to be able to connect them to the existing transmission system, a significantly more expensive option when compared to 115 kV; 230 kV and 345 kV lines are generally used for transferring large amount of power over long distances or providing a back bone for 161 kV or 115 kV transmission systems and are therefore not appropriate options.

In comments on the Certificate of Need Application, Department analyst Dr. Steve Rakow states:

> *the Department concludes that the Applicants' proposed size is reasonable because the proposed transmission line is sized so as to address local issues and coordinates with future potential bulk transmission.*

and,

> *the Department concludes that the Applicants' proposed type is reasonable because:*
>
> - *Use of any other voltage would require the addition of transformers at the Glencoe and West Waconia substations, substantially increasing the total cost;7 and*
> - *Use of a DC design is not a realistic option for short, low voltage transmission lines*

4.5 Upgrading Existing Transmission Lines

The proposed project involves upgrading existing 69 kV transmission lines to 115 kV between the Diamond Substation, Plato Substation, Young America Substation, West Waconia Substation and Augusta Substation. About 9 miles of the total project requires building new transmission lines, the rest of the project involves rebuilding the existing transmission lines.

4.6 Generation Alternatives

Any generation alternative to the transmission line would be required to generate approximately 24 MW of capacity for delivery to the area. It is unlikely that new generation could totally eliminate the need for rebuilding the existing 69 kV system. In order to reduce or minimize the need for the proposed upgrades to the transmission system, the generation would have to be local or distributed generation (DG). This DG would have to be placed strategically to mitigate specific overloads and low voltages.

Distributed generation is not an alternative to the Glencoe – West Waconia section of the 115 kV project as the reliability of the 69 kV line would not be improved from installation of the generation (due to age and condition of the line). Therefore, rebuilding of the 69 kV line would be needed in addition to the distributed generation in the area. A DG plus limited rebuild alternative would not address the needs identified by the Chaska Municipal Service (i.e., United Health Group data center, biotechnology park) in their letter dated March 23, 2011.

In comments on the Certificate of Need Application, Department analyst Dr. Steve Rakow states:

> *…while such a "DG and rebuild" alternative could be economically competitive with the proposed project, it may not be a satisfactory alternative since:*

- *the alternative would be somewhat less reliable without additional generation units being acquired to account for the lower reliability of generation when compared to transmission;*
- *some increased operational costs would be incurred for the existing St. Bonifacius and Glencoe generating units along with the new units to be built in the Waconia—Scott County Area;*
- *substantial operational costs may be incurred if the St. Bonifacius generating unit becomes a must-run unit prior to actually experiencing an outage;*
- *the alternative likely would be less adaptable to high growth futures due to the reliance on 69 kV rather than 115 kV transmission (see page 17 of the petition and the Chaska Letter); and*
- *the alternative likely would be less adaptable to the potential addition of a 345 kV transmission source in the future (see page 37 of the petition).*

Renewable Generation Alternative

The transmission line in question will not interconnect any particular generation resource. Moreover, the transmission line is not needed to interconnect or transmit power from a new generation resource. Rather, the line will transmit electricity from the existing grid generally to the local area. Therefore, the renewable preference statutes (Minnesota Statutes §216B.243, subd. 3a and Minnesota Statutes §216B.2422, subd. 4) do not apply.

5.0 Alternative Routes and Route Segments

Alternative routes, alternative route segments and modifications to the Xcel Energy's proposed alignment were discussed during the scoping meeting and in comments received during the scoping comment period. Three of these alternatives, as described below, were incorporated in the scope of this EA and are evaluated herein.

Maiser alternative route segment
Several residences located along the northwest shores of Rice Lake requested that an *alternative route segment* be considered in a portion of the proposed HVTL route (Segment #4).

The current proposal for Segment #4 consists of a rebuild of approximately 3.2 miles of existing 69 kV transmission line (Line #0735) to a 115 kV transmission line between the intersection of State Highway 5 and 5th Avenue/Tacoma Avenue to the intersection of State Highway 5 and County Road 51. The proposed route is 200 feet wide, centered on the existing alignment of the 69 kV line that extends from the southwest (State Highway 5 and 5th Avenue/Tacoma Avenue intersection) to the northeast (State Highway 5 and County Road 51 intersection) south of State Highway 5 (Figure 6).

The Maiser alternative route segment amends a small section of the proposed route by locating the route along the north side of State Highway 5, beginning from just west of Rome Avenue to the West Waconia Substation, a distance of approximately 1 ¼ miles. This would allow the new 115 kV HVTL to run along the north side of State Highway 5, possibly as a double-circuit with the existing Great River Energy (GRE) 115 kV HVTL (see **Figure 14**).

The stated purpose of this alternative route segment is to reduce the impact to several lakeshore lots that are squeezed between State Highway 5 and the normal high water mark of Rice Lake.

This alternative route segment was incorporated into the scoping decision.

Maiser alternative alignment
The residences located along the northwest shores of Rice Lake also requested that an *alternative alignment* be considered as an additional option to their request for an alternative route segment.

The Maiser alternative alignment would require that the proposed route width be extended north, approximately 100 feet to the southern edge of State Highway 5. This expansion of the route to the north would allow the proposed alignment to be moved north, away from the residences, into/along the southern ROW of State Highway 5.

The stated purpose of this alternative alignment is to reduce the impact to several lakeshore lots that are squeezed between State Highway 5 and the normal high water mark of Rice Lake.

This alternative alignment was incorporated into the scoping decision.

Waldron alternative route segment

A residence located along the County Road 34 requested that an *alternative route segment* be considered in a portion of the proposed HVTL route (Applicant's Segment #2).

The current proposal for the Xcel Energy's Segment #2 consists of a rebuild of approximately 6.4 miles of existing 69 kV transmission line (Line #0771) to a 115 kV transmission line between the Plato Substation and the intersection of State Highway 25/5 and County Highway 34. The proposed route proceeds east from the substation along the north side of McLeod County Road 3 (122nd Street), which becomes Carver County Road 34. The route crosses to the south side of County Road 3 at Zebra Avenue and continues east on the south side of the county road. At Urban Avenue, the route deviates south from the County Road 34 right-of-way, crossing agricultural land and a farmstead. This deviation follows the existing 69 kV transmission line and an abandoned section of old County Road 34. The route rejoins the current County Road 34 just east of the intersection of County Road 33, where it crosses to the north side of County Road 34 and continues to State Highway 25/5 (Figure 4).

The Waldron alternative route segment amends a small section of the Applicant's proposed route by continuing to follow the current County Road 34, eliminating the deviation to the south, between Urban Avenue and State Highway 25/5 (**Figure 15**).

The stated purpose of this alternative route segment is to realign the HVTL with the current ROW of County Road 34, and thereby reduce the impact to several parcels that are currently divided by the existing 69 kV transmission ROW.

This alternative route segment was incorporated into the scoping decision.

Kramer alternative route (Hwy 212) and alternative route segment

A request was submitted for an evaluation of an *alternative route* that would follow the US Highway 212 ROW from the proposed Diamond Substation to the Augusta Substation. Connection from this line to the Diamond Substation would be along Dairy Avenue and the connection between the Augusta Substation and the new line would be along County Road 43.

The stated purpose of this alternative route is to reduce construction and maintenance costs, allow better access for maintaining the transmission line, reduce the length of the HVTL, and to move the ROW to less populated areas.

A request also was submitted for an evaluation of an *alternative route segment* that would follow the US Highway 212 ROW from the Diamond Substation east to the intersection with State Highway 25. The new line would then follow the State Highway 25 ROW northeast approximately one mile, where it would join and continue along the Xcel Energy's proposed HVTL route to the Augusta Substation. Connection from this alternative line to the Diamond Substation would be along Dairy Avenue.

The stated purpose of the Kramer alternatives is to reduce construction and maintenance costs, allow better access for maintaining the transmission line, reduce the length of the HVTL, and to move the ROW to less populated areas.

See **Figure 16** for a representation of the Kramer Highway 212 alternatives.

Xcel Energy's proposed HVTL route passes through several existing load serving substations (Plato, Young America, Augusta); these connections are required to satisfy the stated need for the project, plus minimizing the potential need for new transmission additions in the future. The Highway 212 alternatives would result in the new 115 kV line being further away from these loads centers, thereby reducing the future utility of the line.

Ball-park estimates put the Kramer Highway 212 alternatives between $0.3 and $5.2 million more expensive than the proposed HVTL route.

The proposed HVTL route primarily follows existing transmission line corridors and requires acquisition of only about 2.85 miles of new right-of-way. In contrast, depending on the configuration, the Kramer Highway 212 alternatives would require acquisition of between 12 and 21 miles of new transmission line right-of-way. This new right-of-way will result in impacts to new landowners and environmental resources.

In addition, while new landowners will be impacted by the new right-of-way along Highway 212, landowners along the existing 69 kV transmission line will still have visual impacts as portions of this line will still need to be rebuilt and other portions will remain in place.

Preliminary environmental assessment data indicates that potential environmental and cultural resource issues are comparable for the proposed HVTL route and the Kramer Highway 212 alternatives.

The initial assessment indicates that the distribution of wetlands along the proposed route and the Kramer Highway 212 alternatives are similar in the quantity and quality of potential wetland impacts. However, wetland crossings along the Kramer Highway 212 alternatives would constitute new wetland impacts and thus would add to the overall quantity of wetland impacts because the wetland impacts of the existing 69 kVline would not be eliminated.

Similarly, while the distribution of cultural resource sites is comparable between the proposed HVTL route and the Kramer Highway 212 alternatives, the Kramer Highway 212 alternatives would likely cross lands that have not been previously disturbed.

The Kramer Highway 212 alternatives do not meet Xcel Energy's stated current or potential future local needs of the area, will create new impacts without eliminating the need for the current 69 kV line and cost more than the proposed transmission line upgrade.

The Kramer Highway 212 alternatives were not carried forward into the scoping decision.

6.0 Potential Impacts of the Proposed Route

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

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

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

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.

6.1 Description of Environmental Setting

Much of the project area follows what was once part of the famed “Big Woods” hardwood forests in central Minnesota. However, much of the wooded habitat has been cleared for agricultural purposes. The current day landscape is a mixture of row crops (primarily corn and soybeans), lakes, scattered woodlands, small towns and a growing number of housing developments.

The cities of Glencoe, Plato, Norwood Young America, and Cologne are all within the project area. The McLeod and Carver counties natural environment is home to a variety of wildlife and natural resources. The proposed transmission line rebuild and new line construction are primarily located in agricultural areas. Segments of the line being decommissioned are located in the city of Norwood Young America. This is the only area along the route that is considered urban.

6.2 Socioeconomic

According to 2010 Census data, Carver County is 94.6 percent Caucasian, while McLeod County is 97.7 percent Caucasian. In the townships within the project area, minority groups in the area constitute a very small percentage of the total population, averaging 1.3 percent.

Per capita incomes within the townships in the project area are slightly lower when compared to Carver and McLeod counties on a whole. The proposed route does not contain disproportionately high minority populations or low-income populations. Population and economic characteristics based on the 2010 U.S. Census are presented in **Table 5.**

Table 5. Population and Economic Profile, 2010

Location	Population	Minority Population (Percent)	Caucasian Population (Percent)	Per Capita Income	Percentage of Individuals Below Poverty Level
State of Minnesota	5,220,393	11.0	89.0	$23,198	9.5
Carver County	91,042	5.4	94.6	$28,486	3.9
Young America Township	838 (rural)	2.6	97.4	$23,216	2.2
City of Norwood Young America	3,108	1.9	98.1	$18,431	2.7
Benton Township	939	0.5	99.5	$22,652	1.2
Waconia Township	1,284	0.5	99.5	$27,437	2.1
McLeod County	36,651	2.3	97.7	$20,137	6.2
Helen Township	832	1.9	98.1	$21,010	2.0

Approximately 8 to 12 workers will be required by Xcel Energy for transmission line construction. The transmission crews are expected to spend approximately 6 months constructing the project.

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

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

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 construction, operation and maintenance of the transmission line would not have a significant effect on agricultural operations. Xcel Energy has calculated that approximately 156 acres of agricultural land would be temporarily accessed during construction. 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 McLeod and Carver counties 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 applicants 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 applicants 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 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

One of the first concerns of many residents near existing or proposed transmission lines is how that proximity could affect the value of their property. Those concerns are addressed in this case by comparing similar transmission lines in similar communities.

The Shenehon Company of Minneapolis, a business and real estate valuation company, performed a study on property values in the Maple Grove area relative to proximity to transmission lines. Their conclusions were included in the GRE application for a permit for a 115 kV line in Plymouth and Maple Grove in Hennepin County, EQB Docket No. 03-65-TR-GRE PMG. According to the report, "it is our opinion that single source power lines do not cause a measurable and significant diminution in value to typical single-family homes in Maple Grove … homes defined as larger "family" homes exhibit a slightly larger incremental decrease in selling price. However, given the inexact nature of real estate markets in general, we cannot conclude that the entire difference is attributed to proximity to the power line, or that the difference is considered significant."

In the Final Environmental Impact Statement 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[1]. 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*

[1] 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

> *infrastructure on the landscape, similar to roads, water towers and antenna. They generally do not notice the lines nor do they have strong feelings about them.*

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

- The potential reduction in sale price for single family homes may range from 0 to 14 per cent.
- 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."

Mitigative Measures

Socioeconomic impacts resulting from 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, potential impact would typically be a negotiated settlement in an easement agreement between the Applicants and the landowner. In this case, the incremental differences between properties with the existing 69 kV and the same properties with the proposed 115 kV HVTL would be difficult to discern.

6.3 Displacement

The proposed project maximizes the use of existing transmission line corridors – the proposed route uses existing transmission rights-of-way for all but approximately 2.8 miles of its length.

The use of existing transmission line corridors was an important factor for this project because using existing corridors reduces transmission line proliferation and impacts to residences.

Potential Impacts

There is no structure along the route of this project that would require relocation. Displacement of residential homes or businesses is not anticipated.

Mitigative Measures

Since no relocations would occur, no mitigative measures are required.

6.4 Anticipated Noise Impacts

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

Land use activities associated with residential, commercial, and industrial land are grouped together into Noise Area Classifications (NAC). Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) noise limits for land use activities within the NAC. Table 8 shows the Minnesota Pollution Control Agency (MPCA) daytime and nighttime limits in dBA for each NAC (**Table 6**). 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.

Table 6. 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

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.

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.

Approximately 99 residences and businesses are located within 400 feet of the proposed route. Of these structures, 77 are located along a proposed rebuild route and 34 (12 overlap) are located along the new line construction route. The closest distance that a residence is located to a proposed transmission line rebuild is approximately 15 feet, which occurs in Young America Township. The closest distance that a residence is located to the proposed new line construction is 55 feet which occurs in Benton Township.

Noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible. Additionally, noise levels from the proposed 115/69 kV double circuit transmission lines are expected to be only slightly higher than the existing 69 kV transmission lines in the project Area. Therefore, noise levels from the new line and double circuit line should not be noticeably greater than existing levels.

The EPRI "Transmission Line Reference Book, 345kV and Above", Chapter 6, provides empirically-derived formula for predicting audible noise from overhead transmission lines. Computer software produced by the Bonneville Power Administration (BPA)(BPA, 1977) 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.

The project consists of a 115 kV transmission line and a 115/69 kV double circuit transmission line. Computer modeling performed by Xcel Energy 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 100 wide right-of-way (50 feet from centerline) would be at 19.6 and 16.8 dBA, respectively, well below the MPCA nighttime L50 limit of 50 dBA for Noise Area Classification 1. These findings are shown in **Table 7**.

Table 7. Predicted Audible Noise from HVTL

Structure Type	Noise L5 (50 Feet From Centerline) (Decibels a weighted)	Noise L50 (50 feet From Centerline) (Decibels a weighted)
Braced Post 115kV Steel Pole Single Circuit	18.9	15.4
Braced Post 115kV Steel Pole Single Circuit With Distribution Underbuild	16.6	12.4
Davit Arm 115kV/69kV Steel Pole Double Circuit	16.2	12.7
Davit Arm 115kV/69kV Steel Pole Double Circuit With 12.5kV Distribution Underbuild	15.7	12.2
Davit Arm 115kV/69kV Steel Pole Double Circuit With 34.5kV/34.5kV Distribution Underbuild	19.6	16.8

Transformer Substation Noise

Transformer "hum" is the dominant noise source at substations. Transformer hum is caused by magnetostrictive 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 100Hz (twice the a.c. mains 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.

The nearest occupied homes to the West Waconia and Plato Substations are located 800 feet northwest and 115 feet southeast of the substations, respectively. It would be very unlikely that substation noise would be audible at these homes.

The Applicants have stated that the substations will be designed and constructed to comply with state noise standards established by the Minnesota Pollution Control Agency (MPCA).

Potential Impacts

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

Mitigative Measures

The Applicants have 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.

6.5 Radio and Television Interference

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

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

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

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

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

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

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

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

Mitigative Measures

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

6.6 Aesthetics

Because the proposed project will mainly follow existing 69 kV transmission line routes, the project will have nominal effects on the visual and aesthetic character of the area. The proposed structures for the 115/69 kV double circuit lines will be similar to the other 115/69 kV transmission lines used on the Xcel Energy system. The structures will be about 60 to 105 feet tall and will have an average span of 325 feet. A maximum span of 400 feet will be used between the structures, which will still keep the conductor within the right-of-way under blowout conditions. The usual right-of-way required for these types of structures is 75 feet wide. The existing transmission line structures vary in height between 50 to 90 feet. By comparison, the proposed transmission line structures will generally be slightly taller, ranging from 60 to 105 feet in height. The overall spacing of the poles will be comparable to the current layout, which varies greatly by engineering and land use constraints.

The finish of the proposed poles will be self-weathering steel. The existing transmission line structures in this area are wood poles, and some of the existing poles are of H-frame construction. The proposed steel poles will give the new transmission line a somewhat cleaner and more modern appearance.

Like the existing 69 kV transmission line, the new single circuit and double circuit transmission line will be visible to area residents. The majority of the landscape in the project area is undeveloped and agricultural. The visual effect 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 or as points of visual interest. The transmission lines and substations that already exist in the project area will limit the extent to which the new line and substation are viewed as a disruption it the area's scenic integrity.

Potential Impacts

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

Mitigative Measures

Although the proposed line will alter views of surrounding land uses, the proposed route predominantly uses existing corridors and avoids residences and businesses to the greatest extent practicable. Xcel Energy will work with landowners to identify concerns related to the transmission line aesthetics.

6.7 Public Health and Safety Including EMF

Proper safeguards would need to be implemented for construction and operation of the facility. The project would be designed to comply with local, state, NESC and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and ROW widths. Xcel Energy construction crews and/or contract crews would comply with local, state, NESC and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and 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 would 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. In addition, the substation facilities would be fenced and access limited to authorized personnel. The underground portion of the line would be properly marked, and manhole covers would be heavy enough to prevent unauthorized access. The costs associated with these measures have not been tabulated separately from the overall project costs since these measures are standard practice for Xcel Energy.

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 8** provides the electric fields at maximum conductor voltage for the proposed transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

Table 8. Calculated Electric Fields (kV/m)

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25	0'	25	50'	100'	200'	300'
Segment 1-4 Braced Post 115kV Steel Pole Single Circuit	121	0.006	0.015	0.057	0.185	0.630	1.193	0.493	0.207	0.052	0.013	0.006
Segment 1-4 Braced Post 115kV Steel Pole Single Circuit With 12.5kV Distribution Underbuild	121/13	0.007	0.016	0.054	0.122	0.199	0.179	0.196	0.146	0.053	0.014	0.007
Segment 7 Braced Post 115kV Steel Pole Single Circuit (Operating at 69kV)	72.5	0.004	0.009	0.034	0.111	0.377	0.715	0.295	0.124	0.031	0.008	0.003

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25	0'	25	50'	100'	200'	300'
Segment 7 Braced Post 115kV Steel Pole Single Circuit (Operating at 69kV) With 13.8kV Distribution Underbuild	72.5/15	0.004	0.010	0.033	0.072	0.117	0.129	0.123	0.087	0.032	0.009	0.004
Segment 7 Braced Post 115kV Steel Pole Single Circuit With 13.8kV Distribution Underbuild	121/15	0.007	0.016	0.054	0.121	0.197	0.180	0.195	0.145	0.053	0.014	0.007
Segment 1-4 Davit Arm 115kV/69kV Steel Pole Double Circuit With 12.5kV Distribution Underbuild	121/72.5/13	0.006	0.011	0.016	0.046	0.148	0.227	0.241	0.060	0.041	0.017	0.008
Segment 1-4 Davit Arm 115kV/69kV Steel Pole Double Circuit	121/72.5	0.005	0.010	0.021	0.051	0.407	1.092	0.711	0.076	0.050	0.016	0.007
Segment 5-6 Davit Arm 115kV/69kV Steel Pole Double Circuit (Active 69kV Ckt) With 34.5kV/34.5kV Distribution Underbuild	72.5/36.2/36.2	0.006	0.012	0.017	0.092	0.292	0.141	0.346	0.140	0.040	0.013	0.006

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25	0'	25	50'	100'	200'	300'
Segment 5-7 Davit Arm 115kV/69kV Steel Pole Double Circuit With 34.5kV/34.5kV Distribution Underbuild	121/72.5/36.2/36.2	0.005	0.009	0.006	0.079	0.174	0.54	0.144	0.073	0.040	0.017	0.008

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.

The maximum electric field, measured at one meter above ground, associated with the project is calculated to be 1.19 kV/m (115 kV single circuit).

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 transmission lines for each structure and conductor configuration being considered for the project is shown in **Table 9.** Magnetic fields were calculated for each section of the project under three system conditions: the expected peak and average current flows as projected for the year 2015 under normal (system intact) conditions and peak current flow for the year 2025 under normal (system intact) conditions. The peak magnetic field values are calculated at a point directly under the transmission line 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 (proportional to the inverse square of the distance from source).

The magnetic field produced by the transmission line is dependent on the current flowing on its conductors. Therefore, the actual magnetic field when the project is placed in service is typically less than shown in the charts. This is because the charts represent the magnetic field with current flow at expected normal peak based on projected regional load growth through 2025, the maximum load projection timeline available. Actual current flow on the line will vary, so magnetic fields will be less than peak levels during most hours of the year.

Table 9. Calculated Magnetic Flux Density (milligauss)

Segment	System Condition	Current (Amps)	Distance to Proposed Centerline										
			-300'	-200'	-100'	-50'	-25	0'	25'	50'	100'	200'	300'
West Glencoe to East Glencoe 115kV Sgl Ckt	2015 Peak	171	0.19	0.37	1.47	5.21	12.67	21.84	11.74	5.39	1.86	0.60	0.32
	2015 Average	103	0.11	0.23	0.89	3.14	7.63	13.15	7.07	3.25	1.12	0.36	0.19
	2025 Peak	210	0.23	0.46	1.81	6.40	15.56	26.82	14.41	6.62	2.29	0.74	0.40
East Glencoe to West Waconia 115kV Sgl Ckt	2015 Peak	153	0.17	0.33	1.32	4.67	11.34	19.54	10.50	4.82	1.67	0.54	0.29
	2015 Average	92	0.10	0.20	0.79	2.81	6.82	11.75	6.31	2.90	1.00	0.32	0.17
	2025 Peak	194	0.21	0.42	1.67	5.92	14.38	24.77	13.31	6.12	2.11	0.68	0.37
East Glencoe to West Waconia 115kV Sgl Ckt With 12.5kV Distribution Underbuild	2015 Peak	153/60	0.14	0.29	0.98	2.54	3.98	5.31	5.09	3.05	1.21	0.40	0.21
	2015 Average	92/36	0.09	0.17	0.59	1.53	2.40	3.19	3.06	1.84	0.73	0.24	0.13
	2025 Peak	194/60	0.18	0.36	1.26	3.33	5.32	6.90	6.43	3.88	1.55	0.51	0.27
West Waconia to Carver Co. Tap & Carver Co. Tap to Augusta 115kV Sgl Ckt	2015 Peak	107	0.12	0.23	0.92	3.26	7.93	13.66	7.344	3.3.7	1.16	0.38	0.20
	2015 Average	64	0.07	0.14	0.55	1.95	4.74	8.17	4.39	2.02	0.70	0.23	0.12
	2025 Peak	120	0.13	0.26	1.04	3.66	8.89	15.32	8.24	3.78	1.31	0.42	0.23
Carver Co. Tap to Augusta 115kV Sgl Ckt (Operated at 69kV)	2015 Peak	360	0.39	0.79	3.11	10.98	26.68	45.97	24.71	11.35	3.92	1.27	0.68
	2015 Average	216	0.23	0.47	1.86	6.59	16.01	27.58	14.82	6.81	2.35	0.76	0.41
	2025 Peak	360	0.39	0.79	3.11	10.98	26.68	45.97	24.71	11.35	3.92	1.27	0.68
East Glencoe to West Waconia East Glencoe to Plato	2015 Peak	153/109/150	0.29	0.58	1.78	4.34	7.51	10.34	6.64	3.80	1.47	0.42	0.19
	2015 Average	92/65/90	0.18	0.35	1.07	2.61	4.51	6.21	3.98	2.28	0.88	0.25	0.12

Segment	System Condition	Current (Amps)	Distance to Proposed Centerline										
			-300'	-200'	-100'	-50'	-25	0'	25'	50'	100'	200'	300'
115kV/69kV Dbl Ckt With 12.5kV Distribution Underbuild	2025 Peak	194/109/150	0.33	0.65	1.99	4.84	8.30	10.76	7.38	4.58	1.81	0.53	0.25
East Glencoe to West Waconia East Glencoe to Plato 115kV/69kV Dbl Ckt	2015 Peak	153/109	0.32	0.58	1.74	4.72	9.73	21.65	16.30	7.11	2.12	0.61	0.32
	2015 Average	92/65	0.19	0.35	1.04	2.82	5.82	12.99	9.80	4.27	1.27	0.37	0.19
	2025 Peak	194/109	0.39	0.70	2.03	5.30	10.74	26.06	20.42	9.00	2.69	0.77	0.41
West Waconia to Carver Co. Tap Waconia to Carver Co. Tap 115kV/69kV Dbl Ckt With 34.5kV/34.5kV Dbl Ckt Distr UB	2015 Peak	107/92/75/75	0.16	0.35	1.15	3.36	8.01	18.41	11.81	5.66	1.80	0.45	0.20
	2015 Average	64/55/45/45	0.10	0.21	0.69	2.01	4.81	11.04	7.08	3.39	1.08	0.27	0.12
	2025 Peak	107/92/75/75	0.16	0.35	1.15	3.36	8.01	18.41	11.81	5.66	1.80	0.45	0.20
Waconia to Carver Co. Tap 115kV/69kV Dbl Ckt (Active 69kV Circuit) With 34.5kV/34.5kV Dbl Ckt Distr UB	2015 Peak	92/75/75	0.18	0.40	1.46	4.38	9.36	16.67	8.20	3.58	1.23	0.36	0.17
	2015 Average	55/45/45	0.11	0.24	0.87	2.62	5.61	10.0	4.92	2.15	0.74	0.21	0.10
	2025 Peak	92/75/75	0.18	0.40	1.46	4.38	9.36	16.67	8.20	3.58	1.23	0.36	0.17
Carver Co. Tap to Augusta 115kV Sgl Ckt (Operated at 69kV) With 13.8kV Distribution Underbuild	2015 Peak	360/25	0.31	0.70	2.64	7.38	12.75	16.53	13.07	7.76	3.08	0.99	0.51
	2015 Average	216/15	0.19	0.42	1.58	4.43	7.65	9.92	7.84	4.66	1.85	0.59	0.30
	2025 Peak	360/25	0.31	0.70	2.64	7.38	12.75	16.53	13.07	7.76	3.08	0.99	0.51
Carver Co. Tap to Augusta 115kV Sgl Ckt With 13.8kV Distribution Underbuild	2015 Peak	107/25	0.11	0.25	0.89	2.54	4.68	7.07	5.17	2.62	0.89	0.25	0.11
	2015 Average	64/15	0.07	0.15	0.53	1.52	2.80	4.23	3.09	1.57	0.53	0.15	0.07
	2025 Peak	120/25	0.11	0.22	0.80	2.15	3.55	4.54	4.01	2.43	0.97	0.32	0.17

It can be noted that magnetic fields are not singularly associated with power lines. Every person has exposure to these fields to a greater or lesser extent throughout each day, whether at home or in schools and offices. The following table (**Table 10**) contains field readings for a number of selected, commonly encountered items. These reading represent median readings, meaning one might expect to find an equal number of readings above and below these levels.

Table 10. Magnetic Fields (milligauss) From Common Home and Business Appliances

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

Source: EMF In Your Environment, EPA 1992

Stray Voltage

Stray voltage describes any case of elevated potential, but more precise terminology gives an indication of the source of the voltage.

Neutral to earth voltage (NEV) specifically refers a condition that can occur on the electric service entrances to structures from distribution lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.

HVTLs carry power at a high voltage from generating plants to substations. At the substation, the voltage is lowered for distribution and distribution lines delivery power to consumers (homes, businesses, and industry). Power distribution lines may cause NEV stray voltage on electric service entrances to structures. Transmission lines do not create NEV stray voltage as they do not directly connect to businesses or residences.

However, transmission lines can induce stray voltage on a distribution circuit running parallel or beneath the transmission lines as discuss below.

When an electric field extends to a nearby conductive object, a voltage is induced on the object; this form of stray voltage is termed induction. The magnitude of the voltage depends on the objects ability to collect an electric charge (capacitance), shape, size, orientation, location, object to ground resistance, and weather conditions. If a voltage is induced on an object insulated from the ground and a person touches the object, a small current would pass through their body to the ground. This current may produce a spark discharge or mild shock to the individual. Most shocks from induced current are considered more of a nuisance than a danger. However, to insure public safety, the National Electric Safety Code (NESC) requires induced current of less than 5 milliAmperes (mA) for objects under transmission lines.

Potential Impacts

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 11** summarizes the international and state guidelines for ELF and EMF that current exist.

Table 11. 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

The effect of EMF on human health has been the subject of study for over 25 years. Of particular concern is the link between EMF exposure and cancer. Numerous panels of experts have convened to review research data on whether EMF is associated with adverse health effects. The studies have been conducted by the National Institute of Environmental Health Sciences (NIEHS), the USEPA, the World Health Organization (WHO), and the Minnesota State Interagency Working Group (MSIWG) on EMF issues. Studies regarding EMF exposure and childhood leukemia and other cancer risks have had mixed results. Some organizations have determined that a link between EMF and cancer exists while others have found this link to be weak or nonexistent.

In 1992, Congress initiated U.S. EMF Research and Public Information Dissemination (EMF RAPID). EMF RAPID program studied whether exposure to electric and magnetic fields produced by the generation, transmission, or use of electric power posed a risk to human health.

Program conclusions were presented to Congress on May 4, 1999 as follows:

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

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

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

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

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

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

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

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

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

transmission facilities to meet increasing electrical needs in the State is likely to increase exposure to EMF and public concern regarding potential adverse health effects.

- Based upon its review, the Work Group believes the most appropriate public health policy is to take a prudent avoidance approach to regulating EMF. Based upon this approach, policy recommendations of the Work Group include:
    - Apply low-cost EMF mitigation options in electric infrastructure construction projects;
    - Encourage conservation;
    - Encourage distributed generation;
    - Continue to monitor EMF research;
    - Encourage utilities to work with customers on household EMF issues; and
    - Provide public education on EMF issues (MSIWG, 2002).

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

Continued Research

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

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

Additionally, during his recent testimony on the proposed 345 kV HVTL in response to whether EMF similar to power line exposure can effect 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 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 provide information on the issue to the public, interested customers and employees.

This information contains references to studies, and provides data to help explain the relative impact of transmission line exposure to other EMF exposures most people experience throughout the day at home or at work. Xcel Energy also provides measurements for landowners, customers and employees who request them. In addition, Xcel Energy stated in its application that it would use structure designs that minimize magnetic field levels and, where practicable, site facilities in locations affecting the fewest number of people.

6.8 Recreation

Recreational opportunities in McLeod and Carver counties include hiking, biking, canoeing, boating, fishing, camping, equestrian riding, swimming, hunting, snowmobiling and nature observation.

There are four formal recreational areas located near the project: Friendship Park; Willkommen Park; Meadow Park; and Baylor Regional Park (see **Figures 17 through 23**). Friendship Park and Willkommen Park are both located within the city of Norwood Young America approximately 1/3 mile and 1/10 mile south of the project, respectively. Friendship Park has an ice rink, playground areas as well as soccer and softball fields. Willkommen Park has a baseball field, a pavilion, and other public meeting places.

Meadow Park is located within the city of Cologne nearly 2/3 mile south of the project. This is a small community park with playground equipment. Lastly, Baylor Regional Park, found next to Eagle Lake along County Road 33, is approximately two miles north of the project.

The project is not expected to directly impact any of these recreational resources.

Tiger Lake, Braunworth Lake, Young America Lake, Barnes Lake, Hydes Lake, Rice Lake, Winkler Lake, Benton Lake, Miller Lake and Aue Lake are all located within one mile of the project. Schneewind State Wildlife Management Area (WMA) is located approximately 0.75 mile north of the project near Winkler Lake. Patterson Lake WMA is located next to Patterson Lake and is located nearly one mile north of the project.

The project is not expected to directly impact any of these recreational resources.

Potential Impacts

Visual impacts would be the only potential impact to the aforementioned public lands. There should be minimal new visual impacts to recreationalists from the rebuilt transmission line.

Mitigative Measures

The HVTL will be visible from Tiger Lake, Braunworth Lake, Hydes Lake, Rice Lake, Winkler Lake, Miller Lake and Aue Lake, however direct impact to these resources is not expected. The transmission line would not impact any new areas not already affected by existing transmission lines along designated public lands and therefore no mitigation is necessary or proposed.

6.9 Land-based Economies

Agriculture

Both Carver and McLeod counties have strong economic ties to agricultural production. According to the 2007 United States Department of Agriculture (USDA) Census of Agriculture, Carver County has 800 individual farms, marking a 2 percent decrease in total number of farms over the previous five years.

Agricultural lands cover 169,367 acres, representing over 70 percent of all lands in Carver County with an average farm size of 212 acres. Carver County ranks among the top 20 counties in the production of agricultural products: fruits, tree nuts, and berries (ranking 15th statewide); nursery, greenhouse, floriculture, and sod (ranking 10th statewide); and milk and other bovine dairy products (ranking 13th statewide).

Nearly $93 million was generated from both crop and livestock sales in 2007.

McLeod County also has strong economic dependence on agricultural production. According to the 2007 USDA Census of Agriculture, McLeod County has 1,021 individual farms, marking a 3 percent increase in total number of farms over the previous five years.

Agricultural lands cover 243,958 acres, representing over 77 percent of all land in McLeod County with an average farm size of 239 acres. McLeod County ranks among the top 20 counties in production of cattle and calves (ranking 20th statewide) and milk and other bovine

dairy products (ranking 19th statewide). Over $125 million was generated from both crop and livestock sales in 2007.

Construction activities associated with the project will temporarily access an area of agricultural land estimated at 156 acres. Construction of new transmission structures and removal of existing structures will require repeated access to structure locations to install foundations, structures and conductors. Equipment used in this process includes drill rigs, concrete trucks, backhoes, cranes, boom trucks and assorted small vehicles.

Potential Impacts

No long-term impacts are anticipated to the agricultural economy from the project. During construction, temporary impacts such as soil compaction and crop damages within the ROW may occur.

Mitigative Measures

Landowners will be compensated for the use of their land through easement payments. Additionally, to minimize loss of farmland and rural properties and to ensure reasonable access to the land near the poles, Xcel Energy intends to place the poles approximately five feet from, and overhang the roadway right-of-way. When possible, Xcel Energy will attempt to rebuild the transmission lines before crops are planted or following harvest.

When possible, spring-time construction will be avoided. However, if construction during spring-time is necessary, disturbance to farm soil from access to each structure location will be minimized by using the shortest access route. This may require construction of temporary driveways between the roadway and the structure, but would limit traffic on fields between structures. Construction mats may also be used to minimize impacts on the access paths and in construction areas. Xcel Energy construction teams will work with the property owner, right-of-way agent, and transmission line engineers to minimize the impact on property through use of the owner's knowledge of the property.

In addition to payments for easements acquired, Xcel Energy will compensate landowners for any crop damage and soil compaction that occurs as a result of the project.

Forestry

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

Potential Impacts

Because the route follows existing ROW for much of its length, clearing of trees would be minimal. Impacts to forested areas and shelterbelts along the rebuild portion of the route would

be incidental, and would be limited to the amount necessary to permit safe and reliable operation of the transmission line. Due to safety concerns, any trees that would grow taller than 15 feet within the ROW would need to be removed beneath overhead lines. Additionally, a 10-foot radius around each structure would be kept free of woody vegetation.

Mitigative Measures

Consist with the standard HVTL Route Permit conditions, the construction staging areas will be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. The area will be re-graded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that would facilitate natural re-vegetation and provide for proper drainage and prevent erosion.

Additionally, as a standard condition of a HVTL Route Permit, clearing for access roads will be limited to only those trees necessary to permit the passage of equipment. Temporary access roads will be restored to native vegetation. Native shrubs that would not interfere with the safe operation of the transmission line would be allowed to reestablish in the ROW. However, vegetation that may interfere with the construction, operation or maintenance of the transmission line would be removed.

Mining

According to the Minnesota Department of Transportation (MnDOT) county pit maps for Carver and McLeod counties, there are gravel pits, rock quarries and commercial aggregate sources in the vicinity of the project. Of these, the closest is an inactive gravel pit located approximately 1.5 miles south of the west end of the project, west of the Glencoe Municipal Airport. Because no existing gravel and rock resources are being utilized within the project area, no impacts are anticipated. Unknown resources that may exist along the proposed route would be situated in close proximity to existing utility and roadway ROW, making development unlikely.

Potential Impacts

Since there are no mineral mining or “known but undeveloped resources” along the proposed route, the project has no potential impact on mineral mines.

Additionally, the project would be constructed in the existing ROW and the number of transmission line poles may be reduced. Any potential aggregate resources in the ROW would have already been impacted in terms of their availability for development. Therefore, there would be no additional impacts on potential aggregate resources in the project area.

Mitigative Measures

Because no impacts are anticipated, no mitigation is required.

6.10 Commercial, Industrial, Residential Land Use

Land use in the project area is primarily agriculture and undeveloped/open-space, with the exception of the portions that are proposed to be deconstructed in the city of Norwood Young America, which has residential and commercial land use.

The city of Norwood Young America is the largest urban area in the local region, with a population of over 3,100 (2000 Census). Portions of the proposed new line construction along State Highway 25 to the northwest of the city of Norwood Young America are within the current city limits as indicated on **Figure 24**. This area is currently zoned for agricultural use though it is planned to be added to the Metropolitan Councils Municipal Utility and Service Area between 2020 and 2030. The proposed new line should have minimal impact on the amount of developable ground in this area as it is being sited along side of existing highway right-of-ways.

The closest commercial business to the portion of the project with new line construction is located approximately 190 feet from the line. This structure is located on the northern end of Norwood Young America between Central Avenue N. and State Highway 25. State Highway 25 separates the two features (see Figure 19, segment 3). The closest urban residence to the new line construction is located on the northwest side of Norwood Young America and is approximately 141 feet from the proposed line with State Highway 25 separating the two features (see Figure 19, segment 3). The closest rural residence is located approximately 65 feet from the proposed line at a residence in Benton Township in the southwest quadrant of the intersection of County Highway 51 and 114th Street as indicated on Figure 22, segment 6). The closest farmstead residence is located approximately 55 feet from the proposed line at a residence in Benton Township which is approximately 1,000 feet north of the previously mentioned rural residence.

The closest commercial business to the portion of the project where there will be a transmission line rebuild is located approximately 200 feet from the line. This structure is east of the intersection of State Highway 5 and 106th Street (see Figure 22, segment 6). The proposed transmission line rebuilds are not near any urban areas or residences. The closest farmstead residence to a rebuild segment is located approximately 18 feet from the line (conductor) at a property (PID number 010110300, located at 11025 County Road 153) in Benton Township at the southwest quadrant of the intersection of State Highway 284 and County Road 153 (see Figure 23, segment 7). This would place the structure within the new ROW (easement) should this alignment be approved. The closest rural residence (PID number 110111400 at 15680 County Road 34) to the rebuild line (conductor) is approximately 27 feet at a residence located in the northwest quadrant of the intersection of County Highway 34 and State Highway 25 in Young America Township (see Figure 18, segment 2). This would place the structure within the new ROW (easement) should this alignment be approved.

Classifications of parcels noted in the previous sections were determined by referencing the land use description found in the Carver County Parcel Database. The numbers of structures located within various distances from the project are shown in **Table 12**.

Table 12. Distance to Structures

Segment	Number of Farmsteads or Residences within 0-50' of Proposed Line	Number of Commercial Operations within 0-50' of Proposed Line	Number of Farmsteads or Residences within 51-100' of Proposed Line	Number of Commercial Operations within 51-100' of Proposed Line	Number of Farmsteads or Residences within 101-200' of Proposed Line	Number of Commercial Operations within 101-200' of Proposed Line
Segment 1	0	0	2	0	3	0
Segment 2	5	0	6	1	8	0
Segment 3	1	0	0	0	6	1
Alternate Segment 3a	9	0	34	1	3	0
Alternate Segment 3b	4	0	0	0	0	0
Segment 4	0	0	1	0	0	0
Segment 5	0	0	0	0	1	1
Alternate Segment 5a	1	0	0	0	1	1
Segment 6	0	0	2	0	3	0
Segment 7	2	0	4	0	5	0

Potential Impacts

The Applicant's preferred alignment minimizes new impacts to existing land uses by following existing transmission line ROW for much of its length.

As discussed in Section 3.2, the Applicant will need to acquire new or up-date existing easements 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, Xcel Energy'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 current 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.

FHA guidelines, as specified in the Housing and Urban Development (HUD) Handbook, prohibit mortgage support for homes in the fall zone of high voltage transmission towers or support structures. In order to determine the presence of this safety concern, the handbook specifies a set of guidelines to determine the danger. In this instance, the tower height is used as the fall distance, and transmission lines with a capacity of 60 kV or above are considered high voltage transmission lines (HUD, 2009).

Impacts of the new HVTL ROW are expected to be minimal because the line is adjacent to roadways through these areas.

Mitigative Measures

In general, the rebuild portions of the line would not create new impacts on existing or proposed land use; therefore, no mitigation would be necessary for the majority of the proposed rebuild; however, potential impacts to those properties with existing structures very close to or within the current ROW may be mitigated through final design efforts such as 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.

Xcel Energy stated in the application that it would work with McLeod and Carver counties, city staff and business owners to ensure that impacts to land use from the construction of the line are minimized and addressed.

6.11 Public Services and Transportation

The city of Norwood Young America provides water, sewer and electrical service to its residents. Outside the city limits, along the transmission route, private wells and septic systems are used. Based on comments provided by city staff, no public utility or road improvements

projects are currently planned for the area near the existing 69 kV transmission line within the city of Norwood Young America.

McLeod County is planning for safety upgrade work on County Road 3 within the next five years. Where the project intersects County Road 3, pole locations are being coordinated with county staff so that they will not impede the pending alterations.

Regional transportation studies have been undertaken by both the Carver County and MnDOT.

The Carver County regional study reviewed potential expansion of Township Highway 5, and was completed in partnership with Victoria, Waconia, Chanhassen and Norwood Young America (*Carver County Public Works Department*, 2009). This study did not identify any improvements or realignments within the vicinity of the project area that would impact the proposed alignment. The recommendations nearest the project discuss modifications to the interchange of Trunk Highway 5 and Trunk Highway 212, south of the project.

Impacts to state planning were evaluated through solicitation of formal comment from MnDOT and review of the *Trunk Highway 5 Corridor Study Report, October 2008*.

The report from October 2008 does identify potential improvements within the vicinity of the project, including the need to re-align Trunk Highway 5, Carver County Road 34, and construct some city streets on a new location near Norwood Young America. The implementation of these improvements, however, has not been incorporated into any regional traffic plans, and MnDOT does not have any listed short-term projects in the project area. Because the plans are preliminary in nature and designs are generalized, no specific impacts to these plans can be assessed; indications are that these potential changes may be as much as 30-40 years out and based on the concepts under consideration. No conflicts with these plans and the proposed alignment are anticipated.

However, the potential expansion of Trunk Highway 5 in the vicinity of Rice Lake may impact the Maiser Alternative Route Segment (See Section 7).

MnDOT has adopted a formal policy and procedures for accommodation of utilities on the highway rights-of-way (Utility Accommodation Policy). A copy of MnDOT's policy can be found at:

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

Potential Impacts

No impacts are anticipated to public services due to construction or operation of the proposed project.

Mitigative Measures

Minimal to no impacts to public services are anticipated to occur as a result of the proposed project. Coordination is already under way with McLeod County to coordinate structure placement with upgrades on County Road 3 and no significant conflicts are anticipated. Future planning for state highway improvements or re-alignments is expected to be negotiated under MnDOT's Accommodation Policy. Although no highway planning is yet underway, Segment 3 involves new right-of-way along CSAH 25/5. Transmission line planning will be conducted in accordance with MnDOT policies.

6.12 Archaeological and Historic Resources

During the project's pre-planning phase, the Minnesota State Historic Preservation Office (SHPO) was contacted to solicit comment regarding the potential need for cultural resource surveys. A search of the SHPO database was conducted in order to identify previously-documented sites within one mile of the project. A radius of one mile was used in order to determine the types of archaeological and historic resources, both identified and unidentified, that are likely to be found in the area that could be affected by the project.

Thirty archaeological sites and 23 inventoried historic architectural properties located within one mile of the project. Of the 30 archaeological sites, 27 consist of prehistoric artifacts scatters, two are single artifact finds, and one is a historical documentation record of an abandoned townsite. Two of the previously recorded artifact scatters are Considered Eligible Findings (CEF) by the SHPO due to the potential of these archaeological sites to contain significant information regarding the prehistoric occupation of the region. The eligibility of the remaining inventoried archaeological sites for inclusion on the National Register of Historic Places (NRHP) is unevaluated. A summary of the inventoried archaeological and architectural sites is provided in **Table 13**.

Table 13. Previously Identified Historic Properties

Type of Historic Property	Inventory Number	Description	NRHP Status
Archaeological	21CR0007	Arlo Hasse	unevaluated
Archaeological	21CR0012	Trende	unevaluated
Archaeological	21CR0013	Miller Lake	unevaluated
Archaeological	21CR0018		unevaluated
Archaeological	21CR0019		unevaluated
Archaeological	21CR0023	Manteufel	unevaluated
Archaeological	21CR0024		unevaluated
Archaeological	21CR0025		unevaluated
Archaeological	21CR0026		unevaluated
Archaeological	21CR0027	Barlous Lake	unevaluated
Archaeological	21CR0028	Barlay	unevaluated
Archaeological	21CR0029		unevaluated
Archaeological	21CR0030	Joos	unevaluated
Archaeological	21CR0055	Hardy Hodge	unevaluated

Type of Historic Property	Inventory Number	Description	NRHP Status
Archaeological	21CR0072	Carver Creek No. 1	CEF
Archaeological	21CR0073	Carver Creek No. 2	CEF
Archaeological	21CR0077	Young America	unevaluated
Archaeological	21CR0082	Roepke	unevaluated
Archaeological	21CR0086	Schmid	unevaluated
Archaeological	21CR0089		unevaluated
Archaeological	21CR0090		unevaluated
Archaeological	21CR0121		unevaluated
Archaeological	21CR0122		unevaluated
Archaeological	21CR0146	Laumann	unevaluated
Archaeological	21CR0147	Pautsch	unevaluated
Archaeological	21Crag	Hasse IV	unevaluated
Archaeological	21CRah	Hasse V	unevaluated
Archaeological	21CRai	Hasse VI	unevaluated
Archaeological	21CRe	Benton	unevaluated
Archaeological	21MC0006		unevaluated
Architectural	CR-BNT-005	Johann Schimmelphennig Farmstead	NRHP
Architectural	CR-BNT-123	Round Barn	unevaluated
Architectural	CR-BNT-127	Farmhouse	unevaluated
Architectural	CR-BNT-128	Farmhouse	unevaluated
Architectural	CR-DHL-001	Farmhouse	unevaluated
Architectural	CR-DHL-018	Bridge No. 4766	unevaluated
Architectural	CR-DHL-048	Klepperich Farmstead	CEF
Architectural	CR-DHL-049	Schmidt Farmstead	unevaluated
Architectural	CR-YAC-001	Chicago Northwestern Railroad Depot	unevaluated
Architectural	CR-YAC-002	Henry Bruckschen House	unevaluated
Architectural	CR-YAC-003	Humboldt Lodge No. 312	unevaluated
Architectural	CR-YAC-004	Young America City Hall	NRHP
Architectural	CR-YAC-005	St. John's Lutheran Church	unevaluated
Architectural	CR-YAC-006	Chicago Northwestern Agent's House	unevaluated
Architectural	MC-HEL-001	School	unevaluated
Architectural	MC-HEL-006	Bridge No. 5326	unevaluated
Architectural	MC-HEL-007	Bridge No. L0302	unevaluated
Architectural	MC-PLC-001	Building	unevaluated
Architectural	MC-PLC-002	Plato Garage	unevaluated
Architectural	MC-PLC-005	Diedrich Bergman House	unevaluated
Architectural	MC-PLC-006	Plato Public School	unevaluated
Architectural	MC-PLC-007	Plato Water Tower	unevaluated
Architectural	MC-PLC-008	St. John's Evangelical Lutheran Church	unevaluated

Of the 23 historic architectural properties, two are listed on the NRHP, and one is a CEF. The two NRHP properties are the Johann Schimmelphennig Farmstead, located approximately one mile east of the city of Norwood Young America, Carver County, and the Young America City Hall, located in the northeastern segment of Norwood Young America, Carver County. The CEF is the Klepperich Farmstead located near the eastern terminus of the project. The eligibility of the remaining inventoried historic architectural properties is unevaluated.

Potential Impacts

All of the 53 cultural resource properties identified are located outside the 75 foot transmission line right-of-way and will not experience direct impacts resulting from the construction of this Project. The two NRHP listed properties and the three CEF properties are, on average, one-half mile distant from the proposed project. Further, the existing and proposed transmission route in proximity to the listed or eligible properties will consist of transmission line rebuild. The proposed construction will constitute the replacement of pre-existing features and not create new indirect visual impacts. This also applies to the 48 remaining, unevaluated properties.

Mitigative Measures

Avoidance of archaeological and historic architectural properties is the preferred mitigative policy which Xcel Energy follows for all of its construction projects.

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

There are no anticipated physical 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.

6.13 Natural Environment

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 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 particulates 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.

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

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

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 (USDOE, 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.

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

Segment 1 of the project crosses the 100 year floodplain of Buffalo Creek in two locations. According to FEMA Flood Insurance Rate Maps (FEMA, 1992), Segment 1 will cross the floodplain for distances of 0.55 miles and 0.65 miles immediately southwest of the Plato Substation (see Figure 13 for the location of the floodplain crossings). The crossings occur in predominately agricultural fields in an area of existing line upgrade. The Plato Substation is located outside of this floodplain area.

Various large wetland complexes and small isolated wetlands are located through the project area, although a higher concentration of wetlands exists near the midsection of the proposed transmission route near Norwood Young America. Many of these wetlands are adjacent to the various lakes that lie in close proximity to the project. The National Wetlands Inventory (NWI) was reviewed to assess which wetlands may be present within the project area. Note that the NWI has not been field verified and sometimes contains inaccuracies; however, it is a good tool for initial wetland identification and assessment.

In total, 69 separate wetlands consisting of 14 different wetland types were identified within the 200 foot wide proposed routes for rebuild and retired segments and the 400 foot wide proposed routes for new construction segments. Overall, the 200 and 400 foot wide transmission line routes of the existing line and line to be retired extends approximately 23.8 miles and encompasses approximately 658 acres, of which approximately 56.5 acres (8.6 percent) are wetlands (see Figures 3 through 9). Based on average spacing figures it is anticipated that approximately 455 transmission poles will be necessary to complete the proposed construction. Of these, 49 will be required for new transmission line construction. It is estimated that 61 of these poles will fall within wetlands; 12 of which will be associated with new transmission line construction.

Of the wetlands present within the project area, all but three are classified as Palustrine type wetlands. The other wetland types within the project area are Lacustrine, which are associated with lakes.

The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens (Cowardin et al. 1979). Of those wetlands the majority contain emergent vegetation with some displaying a mixture of shrubs and herbaceous vegetation. Additionally, three of the Palustrine wetlands have no vegetation and contain unconsolidated bottoms. Lacustrine wetland systems are found in the shallow protected areas of lakes with water depth in

the deepest part of the wetland basin greater than 6.6 feet. The areas intersected by the proposed route do not appear to be as deep as 6.6 feet, but they are included as part of the same basin. The PWI also identifies protected wetlands, of which three are shown to intersect the project area. These wetlands, 10-180W, 188W and 189W are located near the middle of the project (see Figures 15 and 16).

The proposed transmission line rebuild will have minor, mostly short term effects on surface water resources. Most potential effects on surface waters will be related to reconstruction of the transmission line across wetlands proximal to the existing transmission corridor. The project could require wetland and water resource approvals from the U.S. Army Corps of Engineers (USCOE), MnDNR, Carver County, and McLeod County. These agencies administer regulatory programs of the federal Clean Water Act and Rivers and Harbors Act, the Minnesota Public Water Resources Act and Utility Crossing Licenses, and the Minnesota Wetland Conservation Act (WCA).

The wetlands identified in and near the proposed project route are listed in **Table 14** and shown in Figures 3 through 9. Surface water resources in the vicinity of the proposed project include a few relatively small wetlands regulated under the WCA, MnDNR Public Waters and Water Courses, and USACE jurisdictional wetlands.

WCA jurisdictional wetlands include farmed or partially farmed wetlands, Type 2 wet meadows, and Type 3 shallow marshes. These small, isolated wetlands may lack USACE jurisdiction.

Table 14. Wetlands Identified in the Vicinity of the Project

County	Cowardin Type	Count	Approx. Area (Acres)
Carver	L1UBH	3	1.04
Carver	PEM/SS1C	1	0.33
Carver	PEM/SS1Cd	1	0.78
Carver	PEMA	7	7.65
Carver	PEMAd	5	3.44
Carver	PEMC	23	14.43
Carver	PEMCd	14	10.33
Carver	PEMCx	1	0.02
Carver	PEMF	5	14.66
Carver	PEMFd	2	2.11
Carver	PSS1/EMCd	1	1.10
Carver	PUB/EMF	1	0.03
Carver	PUBF	1	0.09
Carver	PUBGd	1	0.13
McLeod	PEMA	1	0.44
McLeod	PEMC	2	0.01

Potential Impacts

The majority of the project proposes to replace an existing line with structures that have a similar footprint; therefore, the project would not result in any substantial, permanent wetland impacts or changes. Minimal temporary impacts to wetlands may occur from construction activities and access to the line. Minimal temporary impacts to wetlands may occur if these areas need to be crossed during construction of the transmission ROW. However, the crossing wetlands during construction will be avoided to the greatest extent feasible.

During construction, there is the possibility of sediment reaching surface waters 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 BMPs; as well as, adherence to the terms and conditions of the National Pollution Discharge Elimination System (NPDES) permits and Stormwater Pollution Prevention Plan (SWPPP).

After construction, maintenance and operation activities for substation or transmission line facilities are not expected to have an adverse impact on surface water quality. The small increase in impermeable surface area, resulting from construction and expansion of the project substations, could increase the likelihood of sediment in runoff reaching surface water features. However, the majority of the substation areas would remain as permeable surfaces. BMPs would be employed and erosion potential is not expected to be higher than under the existing land use at the sites.

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 may include containing excavated material, protecting exposed soil and stabilizing restored soil. Xcel Energy 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, Xcel Energy has stated that it would draw on several options during construction to minimize impacts:

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

The transmission line rebuild may require waters and wetlands permits, letters of no jurisdiction, or exemptions from the USCOE, MnDNR Division of Waters, and Carver or McLeod counties. Wetland and surface water impacts will be avoided and minimized to the extent practicable.

After coordination and application submission, authorization from the USACE 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. Carver and McLeod counties administer the WCA in the project area. It is likely that wetland impact minimization will allow the project to be eligible for a WCA de minimis or utilities exemption. If that is not the case, WCA permits will be required.

Minnesota Statutes Section 84.415 requires a utility to obtain a license from the MnDNR Division of Lands and Minerals for the passage of any utility over, under, or across any state land or public waters. Therefore, Xcel Energy will either confirm the applicability of existing licenses for these crossings or obtain new utility crossing licenses prior to construction.

The MPCA regulates construction activities that may impact storm water under the Clean Water Act. It is anticipated that a National Pollution Discharge Elimination System (NPDES) construction storm water permit and Stormwater Pollution Prevention Plan (SWPPP) will be required for the project; as a standard HVTL Permit condition Xcel Energy will obtain the permit and develop a SWPPP as needed. An NPDES permit is required for owners or operators for any construction activity disturbing: 1) one acre or more of soil; 2) less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre; or 3) less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources.

Flora

Land cover in the project area consists of cropland, grassland, wetland, and small areas of woodland and residential/industrial development (Figure 20). Cropland consists of primarily corn and soybeans. Grasslands are dominated primarily by smooth brome, Kentucky bluegrass, red clover, alfalfa, and goldenrod. Reed canary grass, cattail, cottonwood, sandbar willow, and sedges are the primary species in wetlands. Native grassland is relatively scarce in the project area. Transmission line construction impacts to trees and woodlands will be minimized because the transmission line rebuild will follow existing right-of-way. Areas where new transmission line construction is planned are primarily agricultural (see Figures 15 and 18). For a discussion on impacts to agriculture, please see Section 6.9.

Potential Impacts

The majority of flora within habitats in the project area is typical of what will be found in agricultural and rural settings. Since the project would be built along the existing 69 kV transmission line ROW and new construction would be in agricultural areas (Segments 3 and 6) of the project, no additional impacts are anticipated to native vegetation.

Permanent impacts would be minor since the transmission line would be constructed on an existing utility ROW. Additionally, no new ROW would be cleared in forested areas along the

rebuild portions, resulting in minimal impacts to this resource. 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 existing transmission line route and temporarily trimming or removing any shrubs or tall grass. Similar to existing maintenance practices, trees that would grow to taller than 15 feet would be removed beneath the overhead lines.

Mitigative Measures

During construction of the transmission line, impacts to forestry and vegetative resources would be avoided whenever possible. Xcel Energy intends to utilize the existing ROW where clearance requirements have been followed for many years. Additionally, Xcel Energy would maintain sound water and soil conservation practices during construction and operation of the project to protect topsoil and adjacent water resources, and minimize soil erosion. Areas disturbed due to construction activities would be restored to pre-construction contours. In non-cultivated areas, reseeding would occur in a timely manner using a seed mix certified to be free of noxious weeds, if acceptable to the affected landowner.

Fauna

Two MnDNR Wildlife Management Areas (WMA) are located in the vicinity of the project (see Figures 18 and 19). The Schneewind WMA is located approximately one mile east of the West Waconia Substation location in Carver County, covers approximately 49 acres and is composed primarily of wetland (DNR Public Water 08-18P) and grassland. The Patterson Lake WMA is located near Patterson Lake and is situated approximately one mile north of the project.

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

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.

The reconstructed transmission line may affect raptors, waterfowl and other bird species. 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.

Potential Impacts

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the project. Wildlife that inhabits natural areas such as meadows, rivers and lakes could be impacted in the short-term within the immediate area of construction. The distance that animals would be displaced would depend on the species. Impacts to wildlife are anticipated to be short-term since the route primarily would be constructed along an existing transmission line ROW, and the amount of grading and clearing required is minimal. Additionally, the animals in the areas where new construction would occur would be typical of those found in agricultural and rural settings. The new construction should not affect these animals because rural agricultural habitat would remain in the immediate vicinity. Impacts to the wooded areas along the project route would be avoided when possible.

Raptors, waterfowl and other bird species may also be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line. Waterfowl are typically more susceptible to transmission line collision, especially if the line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water which serve as resting areas.

Mitigative Measures

Xcel Energy has been working with various state and federal agencies over the past 20 years to address avian issues. Company personnel work to address problem areas as quickly and efficiently as possible. In 2002, Xcel Energy Inc.'s operating companies entered into a voluntary memorandum of understanding (MOU) to work together to address avian issues through its territory.

The project has been assessed for areas with potential avian issues. Areas where bird diverters might be warranted have been identified. These areas include spans of transmission line that run adjacent to Tiger Lake, Braunworth Lake, Rice Lake, Winkler Lake, and Hydes Lake. Locations where Swan Flight Diverters (SFDs) will be installed are shown on Figures 4 through 10. In most cases, the shield wire of an overhead transmission line is the most difficult part of the structure for birds to see. Xcel Energy has successfully reduced collisions on certain transmission lines by marking the shield wires with SFDs, which are pre-formed spiral shaped devices made of polyvinyl chloride that are wrapped around the shield wire.

6.14 Rare and Unique Natural Resources

There are seven known occurrences of rare or unique resources identified within 1.5 miles of the project area **Table 15**. These resources were identified using the MnDNR Natural Heritage Database.

Table 15. Rare and Unique Resources in the Vicinity of the Project

Common Name	Scientific Name	Type	MN Status [1]	Last Obs.	Proximity (Miles)
American Bittern	*Botaurus lentiginosus*	Vertebrate	No State Status	1991	1.0-1.5
American Bittern[2]	*Botaurus lentiginosus*	Vertebrate	No State Status	2003	0.0-0.5
Sandhill Crane[3]	*Grus Canadensis*	Vertebrate	No State Status	2001	0.5-1.0
Bald Eagle	*Haliaeetus leucocephalus*	Vertebrate	SC	2005	0.5-1.0
Colonial Waterbird Nesting Area	Not Applicable	Animal Assemblag e	Not Applicable	1986	0.5-1.0
Native Plant Community, Undet. Class	Not Applicable	Community	Not Applicable	1995	0.5-1.0
Native Plant Community, Undet. Class	NA Not Applicable	Community	Not Applicable	1995	0.0-0.5

These occurrences include four vertebrate species, two native plant communities of undetermined class, and one colonial waterbird nesting area. Three of the seven records are located within 0.5 mile of the project: the American Bittern, Bald Eagle and a native plant community of an undetermined class. The native plant community was mapped by the Minnesota DNR County Biological Survey (Minnesota DNR, 2008b).

Potential Impacts

In general, impacts to rare and unique natural resources would be avoided because the project is a rebuild of an existing line along most of the route. The area of new HVTL construction would occur in an agricultural area where native species are not likely to occur.

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. If through environmental review, rare species or unique natural resources are identified that will be affected, the HVTL Route Permit will require that Xcel Energy coordinate with the MnDNR and consider modifying either the construction footprint or the construction practices to minimize impacts.

A field survey was completed in November of 2010 to evaluate if the recorded Bald Eagle nesting site is currently occupied. This survey revealed that the nesting site near Rice Lake is no longer present, and no evidence of nests was observed along the balance of the project route. In

the event that an eagle nest is later located and determined to be occupied, efforts will be made to minimize potential impacts from construction activities which may include alteration of pole locations or scheduling construction to avoid nesting season.

7.0 Potential Impacts Comparison of Alternate Routes

In the Alternative Routing Process, applicants are not required to provide any routes for review other than their proposed, preferred route. However, alternatives are often brought forward during the scoping processes by concerned citizens or local governments. In this case, three alternatives were developed through the scoping process and carried forward into the *Scoping Decision* for further consideration. Descriptions of these alternatives are presented in Section 5; potential impacts are discussed below.

7.1 Maiser Alternatives

The residents around Rice Lake requested that the Department evaluate alternatives that would relocate a section of the transmission line to the north, increasing the distance of the line from potential lakeshore lots. Three options were developed for the segment of the line between Rome Avenue and the West Waconia Substation (see Section 5 and Figure 14). These alternatives included:

Option 1 consists of construction of a new ROW along the north side of the existing GRE 115 kV Transmission line (See Figure 14). This alternative would locate Xcel Energy's 115 kV so that it parallels the north side of the existing GRE 115 kV transmission line, which parallels the north side of TH 5. This option would require 50 feet of new ROW.

This additional ROW would impact seven parcels; five of which are developed (See Figure 14). There is a pinch point distance of 39 feet between the veterinary office (parcel ID 095100180) and the existing GRE line. This distance of 39 feet is not wide enough to fit the new fifty foot ROW for the 115 kV line north of the GRE line and south of the veterinary office.

Option 2 consists of constructing Xcel Energy's new 115 kV transmission line as a double-circuit configuration with the existing GRE 115 kV transmission, which parallels the north side of TH 5. This line would utilize GRE's existing ROW, replacing the structures with double-circuit tower designs. GRE's current ROW is 60 feet; the double-circuit configuration would require a ROW width of 75 feet, resulting in the need for an additional 15 feet of ROW for this option. Components of this option would include: 3 additional heavy angle corner structures to cross the highway; 10 double circuit structures, 800 feet of additional conductor, 4,000 feet of additional shield wire, new insulators for the GRE line, and the removal of the GRE structures and transfer of the GRE conductors.

Option 3 consists of an alignment modification within Xcel Energy's proposed HVTL route (See Figure 14). In this alternative the new 115 kV transmission line would be shifted approximately 100 feet to the north, to run along the current edge of the road ROW for TH 5.

Trunk Highway 5 runs in a southwest-northeast direction between TH 7 and TH 212 in Carver County. At present, TH 5 is a four-lane divided arterial from I-494 to TH 41; however, just west

of TH 41 it is a two-lane, undivided arterial that extends through Victoria and Waconia until it connects with TH 212 in Norwood Young America, a distance of 20 miles.

The *Trunk Highway 5 Corridor Study: From TH41 to TH212*, was undertaken by Carver County and the cities of Victoria and Waconia, in collaboration with MnDOT and the communities along the corridor, in an effort to guide future planning and improvements along TH 5 from TH 41 in Chanhassen to TH 212 in Norwood Young America.

Through conversation with MnDOT and review of the study, the EFP staff has become aware of MnDOT's desire to preserve land along the southern ROW of TH 5 for future expansion. The current concept would extend the TH 5 ROW 90 feet to the south (**Figure 25**). This would place the TH 5 ROW 16 feet north of Xcel Energy's current 69 kV line, which is the proposed ROW for the new 115 kV HVTL.

Table 16 contains comparative data for the three Maiser options compared to Xcel Energy's proposed HVTL route/alignment.

Table 16. Comparison of Impacts, Maiser Options

Proximity to Structures from Alignment			
Route	**Type**	**Count**	**Distance (feet)**
Maiser Alternative Option 1	Commercial (Parcel ID # 095100080)	1	14.5
	Rural Residence (Parcel ID # 090310700)	1	121
	Rural Residence (Parcel ID # 09200020)	1	143
	Rural Residence (Parcel ID # 097200010)	1	243
	Rural Residence (Parcel ID # 095100101)	1	409
	Rural Residence (Parcel ID # 095100101)	1	409
Maiser Alternative Option 2	Commercial (Parcel ID # 095100080)	1	39.5

	Rural Residence (Parcel ID # 090310700)	1	146
	Rural Residence (Parcel ID # 09200020)	1	168
	Rural Residence (Parcel ID # 097200010)	1	268
	Rural Residence (Parcel ID # 095100101)	1	434
	Rural Residence (Parcel ID # 095100101)	1	434
Maiser Alternative Option 3	Rural Residence (Parcel ID # 09200030)	1	88.4
Xcel Proposed	Rural Residence (Parcel ID # 09200030)	1	72.4
Land Use Occupied by ROW			
Route	**Classification**	**Area (sq ft)**	**Acres**
Maiser Alternative Option 1	Corn	15,312	0.35
	NLCD Developed/low intensity	79,875	1.83
	NLCD Developed/open space	103,749	2.38
	NLCD Pasture/hay	45,781	1.05
Maiser Alternative Option 2	Corn	8,464	0.19
	NLCD Developed/low intensity	109,819	2.52
	NLCD Developed/open space	120,904	2.78
	NLCD Pasture/hay	85,735	1.97
Maiser Alternative Option 3	NLCD Developed/low intensity	25,246	0.58

	NLCD Developed/open space	20,893	0.48
	NLCD Pasture/hay	247,984	5.69
Xcel Proposed	NLCD Developed/low intensity	18,907	0.43
	NLCD Developed/open space	14,940	0.34
	NLCD Pasture/hay	259,110	5.95
Wetlands Occupied by ROW			
Route	**Type**	**Area (sq ft)**	**Acres**
Maiser Alternative Option 1	PEMCd	13,939	0.32
	PEMC	6,098	0.14
Maiser Alternative Option 2	PEMCd	8,111	0.19
	PEMC	9,656	0.22
Maiser Alternative Option 3	No wetlands within the 75' ROW		
Xcel Proposed	No wetlands within the 75' ROW		
Cost			
Route	**Estimate ($)**		
Maiser Alternative Option 1	91,000.00		
Maiser Alternative Option 2	670,000.00		
Maiser Alternative Option 3	45,000.00		

7.2 Waldron Alternative Route Segment

The Waldron alternative route segment amends a small section of the Applicant's proposed route by re-aligning the ROW so that it continues along the south side of County Road 34, eliminating

the ROW's deviation to the south, between Urban Avenue and State Highway 25/5 (See Figure 15).

The re-alignment of the transmission line would relocate the ROW through 5 parcels (See Figure 15), moving the line to each parcels northern boundary with the ROW for County Road 34; the existing ROW would be abandoned.

Table 17 contains comparative data for the Waldron alternative compared to Xcel Energy's proposed HVTL route/alignment.

Table 17. Comparison of Impacts, Waldron Alternative

Proximity to Structures from Alignment			
Route	**Type**	**Count**	**Distance (feet)**
Waldron Alternative	Farmstead	1	124
	Rural Residence	1	151
Xcel Proposed	Farmstead	1	82
	Rural Residence	1	130
	Rural Residence	1	66
Land Use Occupied by ROW			
Route	**Classification**	**Area (sq ft)**	**Acres**
Waldron Alternative	NLCD Deciduous Forest	32,765	0.75
	NLCD Developed/low intensity	18,694	0.43
	NLCD Developed/open space	69,123	1.59
	NLCD Herbaceous Wetlands	50,296	1.15
	NLCD Pasture/hay	105,264	2.41
	Pasture/grass	13,787	0.32
Xcel Proposed	NLCD Deciduous Forest	75,101	1.72
	NLCD Developed/low intensity	15,977	0.37
	NLCD Developed/open space	86,812	1.99

	NLCD Grassland Herbaceous	13,799	0.32
	NLCD Herbaceous Wetlands	24,004	0.55
	NLCD Pasture/hay	60,276	1.38
	Pasture/grass	13,791	0.32
Wetlands Occupied by ROW			
Route	**Type**	**Area (sq ft)**	**Acres**
Waldron Alternative	PEMCd	21,196	0.49
	PEMFd	12,289	0.28
Xcel Proposed	PEMCd	6,857	0.15
Cost			
Route	**Estimate ($)**		
Waldron Alternative	25,000.00		

8.0 Unavoidable Impacts

The Glencoe-Waconia Transmission line rebuild project would have no significant unavoidable adverse impacts. It would not have the same level of impacts that are usually associated with the construction of new transmission line due to the fact that it is a rebuild of an existing line. As the project is a mostly a rebuild, the bulk of the new impacts would be related to those short term impacts that are associated with the construction of the transmission line project. The long term impacts of the transmission line, those related to land and visual impacts, have already been realized with the existing line. As the majority of the proposed line would be located in essentially the same place as the existing line, the incremental long term impacts of changing out the structures would not result in significant changes. Operating the transmission line at the higher voltage level of 115 kV would also not result in a significant environmental impact. In addition, the significant ROW sharing associated with this project would further mitigate the direct impacts associated with the construction of the new line.

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. 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.

Figures

Appendix A – Scoping Decision

Appendix B – Sample Route Permit