414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

April 12, 2012

--Via Electronic Filing--

Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East
Suite 350
St. Paul, MN 55101

RE: NORTHERN STATES POWER COMPANY APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A ROUTE PERMIT FOR THE SOUTHWEST TWIN CITIES SCOTT COUNTY – WESTGATE 115 KV TRANSMISSION LINE REBUILD PROJECT
ALTERNATIVE PERMITTING PROCESS
DOCKET NO. E002/TL-11-948

Dear Dr. Haar:

Northern States Power Company, a Minnesota corporation ("Xcel Energy") is electronically filing an application for a route permit for the Southwest Twin Cities Scott County – Westgate 115 kV Transmission Line Rebuild Project ("Project") pursuant to the alternative permitting procedures in Minnesota Rules 7850.2800 to 7850.3900.

The proposed Project includes converting or upgrading approximately 20 miles of 69 kV transmission line to 115 kV capacity between the Scott County Substation and the Westgate Substation and modifying the associated substation facilities located near the cities of Shakopee, Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie in Scott, Carver, and Hennepin Counties.

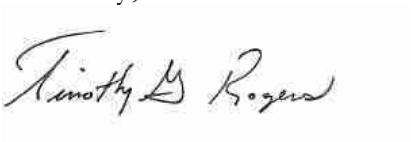
Xcel Energy has also filed an application for a Certificate of Need for this Project and requests that the hearings in the Certificate of Need and Route Permit proceedings be held jointly for the sake of efficiency. *See* Minn. Stat. § 216B.243, subd. 4; Minn. R. 7850.2600, Subp. 3. The Certificate of Need Application was filed on March 9, 2012 in MPUC Docket No. E002/CN-11-332.

This filing consists of the body of the Application and associated appendices, 15 files in total, as follows:

Cover Letter and Application - 1 file
Appendix A - 1 file
Appendix B - 4 files
Appendix C - 1 file
Appendix D - 1 file
Appendix E - 4 files
Appendix F - 1 file
Appendix G - 1 file
Appendix H - 1 file

Enclosed are two paper copies and 1 CD copy of the route permit application. Additional copies of the application are being sent to the Department of Commerce under separate cover. Please call me at (612) 330-1955 if you have any questions.

Sincerely,



Timothy Rogers
Supervisor, Siting and Permitting

Enclosure

cc: David Birkholz, Department of Commerce, Energy Facilities Permitting
Project Service List

4591376v1

NORTHERN STATES POWER COMPANY
APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION
FOR A ROUTE PERMIT

SOUTHWEST TWIN CITIES ("SWTC")
SCOTT COUNTY – WESTGATE
115 KV TRANSMISSION LINE REBUILD PROJECT

Alternative Permitting Process
PUC Docket No. E002/TL-11-948

APRIL 12, 2012

This page is intentionally blank.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS
(continued)

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

This page is intentionally blank.

1.0 EXECUTIVE SUMMARY

1.1 PROPOSAL SUMMARY

Northern States Power Company, a Minnesota corporation ("Xcel Energy", "Applicant" or the "Company") submits this application ("Application") for a Route Permit to the Minnesota Public Utilities Commission ("MPUC" or "Commission") pursuant to Minnesota Statutes Section 216E and Minnesota Rules Chapter 7850.

A Route Permit is requested to remove approximately 14.6 miles of 69 kilovolt ("kV") transmission line and replace it with a 115 kV line along with associated substation transformers and switches between Structure #57 (located slightly north of the Bluff Creek Substation) and the Westgate Substation near the cities of Chaska, Shakopee, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie located southwest of the Twin Cities metro area (the "Project"). The Bluff Creek Substation is located along County Road 18 (Lyman Boulevard) northeast of Hazeltine Lake in the City of Chanhassen. The Westgate Substation is located northeast of the intersection of U.S. Highway 212 and State Highway 5 along Venture Lane in the City of Eden Prairie.

Structure #57 is the starting point for the rebuild portion of the Project as this is where the existing double circuit 115/69 kV line (Line #5516/Line #0734) from the Scott County Substation splits from the 115 kV line (Line #5516) that heads east and the 69 kV line (Line #734), which will be proposed rebuilt as part of this Project, heads north toward the Excelsior Substation.

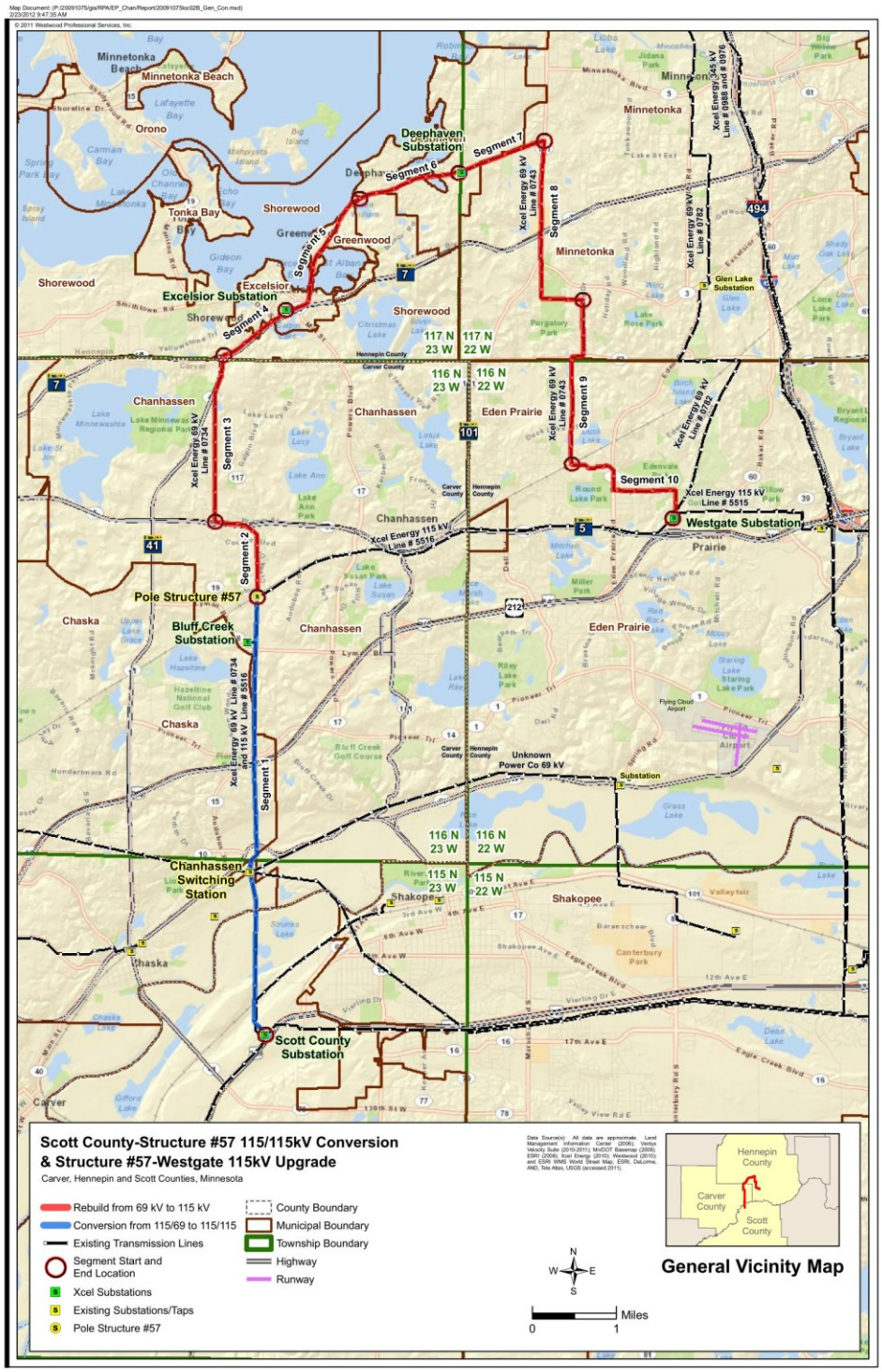
A Route Permit is also requested to convert approximately 5.3 miles of 115/69 kV double circuit transmission line to 115/115 kV double circuit line between the Scott County Substation and Structures #57 near the cities of Shakopee and Chaska. The Scott County Substation is located north of U.S. Highway 169 between the intersection of County Road 69 and Chestnut Boulevard. This 5.3 miles of 115/69 kV double circuit line was constructed to be capable of 115/115 kV operation by Xcel Energy in 1987. **Figure 1** shows the proposed Project.

Minnesota Statutes § 216E.04 and Minnesota Rules 7850.2800 to 7850.3900 provide for an Alternative Permitting Process for certain high voltage transmission line ("HVTL") facilities. The proposed rebuild and conversion of the 69 kV transmission line to a 115 kV transmission line with associated facilities, qualify for consideration under the Alternative Permitting Process because the proposed upgraded transmission lines are between 100 and 200 kV. Minn. Stat. § 216E.04, subd. 2(3); Minn. R. 7850.2800, Subp. 1(C) (authorizing

alternative process for HVTLs between 100 and 200 kV). This Application is submitted pursuant to the Alternative Permitting Process outlined in Minnesota Rules 7850.2800 to 7850.3900. A Certificate of Need for this Project was submitted on March 9, 2012 in docket E002/CN-11-332.

Xcel Energy requests that the Commission approve the Proposed Route and authorize a route width of 100 feet on each side of the route centerline of the existing 69 kV and 115/69 kV facilities (200 feet total width). Xcel Energy will construct the proposed rebuild of the existing 69 kV line between Structure #57 and the Westgate Substation on the current centerline and within existing right-of-way where reasonably possible. If new right-of-way is required, Xcel Energy typically requires a right-of-way of 75 feet wide (37'6" from the centerline of the structure) for new 115 kV transmission line construction. No additional right-of-way will be required for the conversion of the 5.3 miles of 115/69 kV double circuit transmission line to 115/115 kV double circuit line as no physical modifications of the existing line will be required.

Figure 1
General View of Proposed Project



1.2 COMPLETENESS CHECKLIST

The content requirements for an application with the Commission under the Alternative Permitting Process are identified in Minnesota Rules 7850.2800 to 7850.3900. The rule requirements are listed in **Table 1** with references indicating where the information can be found in this Application.

Table 1
Completeness Checklist

Authority	Required Information	Where
Minn. R. 7850.2800, Subp. 1(C)	**Subpart 1. Eligible Projects**	
	An applicant for a site permit or a route permit for one of the following projects may elect to follow the procedures of parts 7850.2800 to 7850.3900 instead of the full permitting procedures in part 7850.1700 to 7850.2700 for high voltage transmission lines of between 100 and 200 kilovolts.	2.4
Minn. R. 7850.2800 Subp. 2	**Subpart 2. Notice to Commission**	
	An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 7850.2800 to 7850.3700, shall notify the PUC of such intent, in writing, at least 10 days before submitting an application for the projects.	2.5 and **Appendix A.1**
Minn. R. 7850.3100	**Contents of Application (alternative permitting process)**	
	The applicant shall include in the application the same information required in part 7850.1900, except the applicant need not propose any alternative sites or routes to the preferred site or route. If the applicant has rejected alternative sites or routes, the applicant shall include in the application the identity of the rejected sites or routes and an explanation of the reasons for rejecting them.	4.3 (See also 7850.1900, Subp. 2 below)
Minn. R. 7850.1900, Subp. 2 (applicable per Minn. R. 7850.3100)	**Route Permit for HVTL**	
A.	a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	2.1
B.	the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated	2.2
C.	at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference	Not applicable, per Minn. R. 7850.3100
D.	a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	3.2, 4.1, 5.1.1
E.	environmental information required under 7850.1900, Subp. 3	See Minn. R.

Authority	Required Information	Where
		7850.1900, Subp. 3 (A)–(H) below
F.	identification of land uses and environmental conditions along the proposed routes	Chapter 6.0
G.	the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	7.2, **Appendix E.1**
H.	United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	**Appendix B**
I.	identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way, the land used by a public utility (as for a transmission line), with the proposed line	5.1.2
J.	the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	Chapter 5.0
K.	cost analysis of each route, including the costs of constructing, operating, and maintaining the high voltage transmission line that are dependent on design and route	3.5 and 5.1.7
L.	a description of possible design options to accommodate expansion of the high voltage transmission line in the future	4.4 and 4.5
M.	the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line	5.1.3 – 5.1.6
N.	a listing and brief description of federal, state, and local permits that may be required for the proposed high voltage transmission line	7.4
O.	a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	2.3
Minn. R. 7850.1900, Subp. 3	**Environmental Information**	
A.	a description of the environmental setting for each site or route	6.1
B.	a description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services	6.2
C.	a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	6.3
D.	a description of the effects of the facility on archaeological and historic resources	6.4
E.	a description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna	6.5
F.	a description of the effects of the facility on rare and unique natural resources	6.6

Authority	Required Information	Where
G.	identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	See all of the effects described in Chapter 6.0
H.	a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	See all of the mitigative measures identified in Chapter 6.0

2.0 INTRODUCTION

2.1 STATEMENT OF OWNERSHIP

Xcel Energy is a Minnesota corporation with its headquarters in Minneapolis, Minnesota. Xcel Energy is a wholly-owned subsidiary of Xcel Energy Inc., a utility holding company with its headquarters in Minneapolis. Xcel Energy provides electricity services to approximately 1.3 million customers and natural gas services to 425,000 residential, commercial and industrial customers in Minnesota. Xcel Energy Services Inc. is the service company for Xcel Energy and its personnel prepare, submit and administer regulatory applications to the Commission on behalf of Xcel Energy, including route permit applications.

Xcel Energy will own and operate the converted 115/115 kV double circuit transmission line (Line #5516/Line #0734) with associated facilities between the Scott County Substation in Scott County and Structure #57 in Carver County. Xcel Energy will build, own, and operate the rebuilt 115 kV single circuit transmission line (Line # 0734) with associated facilities between Structure #57 and the Westgate Substation in Hennepin County.

2.2 PERMITTEE

The permittee for the proposed Project is:

Permittee: Northern States Power Company, a Minnesota corporation

Contact: Timothy G. Rogers
Supervisor, Siting and Permitting

Address: Xcel Energy Services Inc.
414 Nicollet Mall, MP-8A
Minneapolis, MN 55401

Phone: (612) 330-1955

E-mail: timothy.g.rogers@xcelenergy.com

2.3 CERTIFICATE OF NEED

Minnesota Statutes Section 216B.243, subd. 2 states that no large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need ("CON") by the

Commission. The 115 kV transmission line proposed for the Project is a "large energy facility" because it has a capacity in excess of 100 kV and is more than 10 miles long. Xcel Energy submitted a CON with the Commission on March 9, 2012 in conjunction with this Route Permit application. The CON docket number is 11-332. Xcel Energy is requesting the CON and Route Permit applications be considered together and that a joint hearing be held pursuant to Minn. Stat. Section 216B.243, subd. 4; Minn. R. 7850.2600, Subp. 3 and Minn. R. 7849.1900, subp. 4.

2.4 ROUTE PERMIT, ALTERNATIVE PERMITTING PROCESS

The Project includes converting an existing 115/69 kV transmission line (Line #5516/Line #0734) to a 115/115 kV transmission line between the Scott County Substation and Structure #57. The proposed Project also involves removal of the existing 69 kV transmission line (Line #0734) and replacing it with a 115 kV single circuit transmission line between Structure #57 and the Westgate Substation. The Project also includes upgrading transformers and other substation modifications at the Scott County, Bluff Creek, Excelsior, and Deephaven substations. The Project therefore qualifies for review under the Alternative Permitting Process authorized by Minnesota Statutes Section 216E.04, subd. 2(3) and Minnesota Rules 7850.2800, Subp. 1(C) (establishing alternative process for HVTLs between 100 and 200 kV). Accordingly, Xcel Energy is following the provisions of the Alternative Permitting Process outlined in Minnesota Rules 7850.2800 to 7850.3900 for this Project.

2.5 NOTICE TO THE COMMISSION

Xcel Energy notified the Commission on September 22, 2011, by letter (mailed and electronically filed) that Xcel Energy intended to use the Alternative Permitting Process for the Project. This letter complies with the requirement of Minnesota Rules 7850.2800, Subp. 2, to notify the Commission of this election at least 10 days prior to submitting an application for a Route Permit. A copy of the letter is attached in **Appendix A.1**.

3.0 PROJECT INFORMATION

3.1 PROJECT LOCATION

The Project is located in Carver, Hennepin, and Scott counties, and within the cities of Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie, and Jackson Township. **Appendix B.1** includes detailed maps of the townships crossed by the Proposed Route and Project Area. **Table 2** identifies the counties, cities and townships ("Local Government Units" or "LGUs"), in addition to the Public Land Survey ("PLS") designation of areas occupied by the Proposed Route.

The western end of the Project Area is located at the Scott County Substation in Jackson Township, Scott County. From there, the Project Area extends to the north through Chanhassen Township, Carver County to the cities of Chaska and Chanhassen; into and across the cities of Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka and Eden Prairie; terminating at the Westgate Substation located in the City of Eden Prairie, Hennepin County. **Table 2** below summarizes the proposed Project location. **Appendix B.1** contains a General Vicinity Map – Segment 1-10 that identifies the Project Area.

Table 2
Project Location

County/Township/City	PLS Township (N)	PLS Range (W)	PLS Sections
Carver / Chanhassen, Chaska	116	23	3, 4, 9, 10, 15, 22, 27, 34
Carver / Chanhassen, Chaska	115	23	3
Hennepin / Shorewood, Excelsior, Greenwood, Deephaven	117	23	23, 24, 26, 34, 35
Hennepin / Deephaven, Minnetonka	117	22	19, 20, 29, 30, 31, 32
Hennepin / Eden Prairie	116	22	5, 8, 9
Scott / Jackson	115	23	3, 10, 15

3.2 PROJECT PROPOSAL

The proposed route for the Project measures approximately 20 miles in length and follows existing transmission line corridors. Xcel Energy proposes to:

- **Segment 1**: Convert approximately 5.3 miles of existing 115/69 kV transmission line (Line #5516/#0734) to 115/115 kV operation between the existing Scott County Substation and Structure #57. The existing 115/69 kV line begins at the Scott County Substation located north of U.S. Highway 169 between the intersection of County Road 69 and Chestnut Boulevard. The route extends to the northwest from the Scott County Substation approximately 0.18 miles. The route proceeds north approximately 1.35 miles where it crosses the Minnesota River into the City of Chaska in Carver County, passing between commercial and agricultural properties. It proceeds north from the Minnesota River approximately 3.77 miles through residential and commercial development along the eastern edge of the City of Chaska, crossing Flying Cloud Drive, Highway 212, Pioneer Drive, and Lyman Boulevard and terminating at Structure #57.

- **Segment 2:** Remove approximately 1.29 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #57 (Line #5516) and Structure #47 (Line #0734). This route begins at Structure #57 (Line #5516), located on the south side of the Twin Cities & Western Railroad Company (TC&W) railroad tracks, approximately 0.44 miles east of the point where the rail line intersects Carver County Highway 18 (Lyman Boulevard). The route proceeds north approximately 0.73 miles, passing between residential and commercial development. It proceeds from this point towards the northwest approximately 0.16 miles, crossing to the north side of CSAH 5. The route then parallels the north side of the highway approximately 0.38 miles to the west, terminating at Structure #54.

- **Segment 3:** Remove approximately 2.00 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #54 to the intersection of State Highway 41 and State Highway 7. This route proceeds north from Structure #54 through residential development for approximately 1.6 miles towards the eastern edge of State Highway 41. The route parallels State Highway 41 for approximately 0.41 miles to Structure # 74 at the intersection of State Highway 7.

- **Segment 4:** Remove approximately 0.95 miles of existing 69 kV transmission line and replace it with a 115 kV transmission line along the northern side of State Highway 7 between the intersection of State Highway 41 and State Highway 7 and the Excelsior Substation, located in the central portion of Excelsior, Minnesota. This route will be aligned along the north side of the roadway for all but the easternmost 500 feet, which passes between commercial properties into the substation.

- **Segment 5:** Remove approximately 1.73 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between the Excelsior Substation

and Structure #135 located near the municipal boundary between the Cities of Greenwood and Deephaven, Minnesota. This route extends from the Excelsior Substation to the east along the north side of Minnesota Highway #7 to Structure #101. The route then extends to the north, first along the west side of Minnetonka Boulevard through the cities of Excelsior and Greenwood and next along the east side of Fairview Street in Greenwood.

- **Segment 6:** Remove approximately 1.28 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #135 located near the municipal boundary between the Cities of Greenwood and Deephaven, Minnesota and the Deephaven Substation, located at the intersection of Minnetonka Boulevard and Vinehill Road near the municipal boundary between the cities of Deephaven and Minnetonka, Minnesota. The route will extend to the east and parallel both Minnetonka Boulevard and the Lake Minnetonka LRT Regional Trail.

- **Segment 7:** Remove approximately 1.00 mile of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between the Deephaven Substation and Structure #175 (Line #0734) located at the intersection of the Lake Minnetonka LRT Regional Trail and Hennepin County Highway #101 in the City of Minnetonka, Minnesota. The route extends to the east from the Deephaven Substation through residential development, paralleling the southern edge of the Lake Minnetonka LRT Regional Trail.

- **Segment 8:** Remove approximately 2.38 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #175 (Line #0734) located at the intersection of the Lake Minnetonka LRT Regional Trail and Hennepin County Highway #101 in the City of Minnetonka, Minnesota and Structure #226 (Line #0734) located on the west side of Scenic Heights Drive, near the northeastern corner of the Scenic Heights Elementary Schoolyard in the City of Minnetonka, Minnesota. The route parallels Hennepin County Highway #101 to the south through both residential and commercial development, crossing Minnesota Highway #7 and continuing through residential development to Purgatory Park. The route extends to the east from this point, passing through Purgatory Park towards Scenic Heights Drive.

- **Segment 9:** Remove approximately 2.10 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #226 (Line #0734) located on the west side of Scenic Heights Drive, near the northeastern corner of the Scenic Heights Elementary Schoolyard in the City of Minnetonka, Minnesota and

Structure #270 (Line #0734) located on the northwestern corner of the Eden Prairie High School campus in the City of Eden Prairie, Minnesota. The route proceeds south from Structure #226 through residential development along the western side of Scenic Heights Drive to the intersection with Hennepin County Highway #62 (Townline Road). The route extends to the west along the north side of Hennepin County Highway #62 to the intersection with Duck Lake Road. The route continues to the south, paralleling Duck Lake Road, passing over the Twin Cities and Western Railroad line and continuing towards Structure #270 on the Eden Prairie High School Campus.

- **Segment 10:** Remove approximately 1.87 miles of existing 69 kV transmission line (Line #0734) and replace it with a 115 kV transmission line between Structure #270 (Line #0734) located on the northwestern corner of the Eden Prairie High School campus in the City of Eden Prairie, Minnesota and the Westgate Substation. The route proceeds to the east across the Eden Prairie High School campus and crosses to the east side of Hennepin County Highway #4 (Eden Prairie Road). The route extends to the south to the intersection with Valley View Road and turns towards the east. The route parallels the north side of Valley View Road towards Structure #301. The route proceeds to the south towards the eastern termination of the project at the Westgate Substation.

3.3 NEED FOR PROJECT

Xcel Energy initiated the CON application process with the Commission on April 19, 2011 by filing a Notice Plan Petition in Docket No. 11-332. Xcel Energy submitted a CON application on March 9, 2012. A summary of the need for the Project is presented below.

The need for this Project is identified in the *Southwest Twin Cities Phase 2 Study Update Review* dated July 8, 2011. The Project is needed to address overload and low voltage conditions in the Project area when certain transmission lines are out of service. There are existing overloads and low voltages that need to be addressed immediately and the transmission planning studies indicate that, without the proposed Project, there would be additional overloads of transmission line facilities and low voltages in the Project area in the future.

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, damaging customer equipment such as process controls, motor drive controls, and automated machines. Thermal overload on transmission lines is not acceptable as it could damage the facilities due to excessive heat, this could also cause safety concerns due to unsafe ground clearance of transmission lines. In addition overload on facilities, that operate at a voltage greater than 100 kV, is a violation of NERC standards. Without the proposed

transmission upgrades, overloading and low voltage conditions will worsen as the area experiences continued growth and development.

The loss of the Eden Prairie-Westgate 115/115 kV double circuit transmission line is the most critical outage identified in the transmission planning studies. This line is the only tie between Eden Prairie 345/115 kV Substation, which serves the largest load in the area, and Westgate 115/69 kV Substation. When the Eden Prairie-Westgate 115/115 kV double circuit line is out of service, the 345 kV source to the area is disconnected. As a result, the entire load at the Westgate Substation would be served from Scott County Substation, resulting in overloads or potential overloads on the other transmission lines in the area and in low voltages between the Minnesota River Substation and the Westgate Substation. The studies also indicated that several 115 kV line overloads could occur near Scott County Substation in the future from the loss of Westgate – Eden Prairie double circuit 115 kV line.

The proposed Project would eliminate the overloads on the Scott County Substation transformer and 69 kV lines. The proposed upgraded 115 kV lines also prevent potential future overloads on the 115 kV lines near Scott County Substation as the proposed Project would provide a parallel 115 kV path from the Scott County Substation to the Westgate Substation. This Project is designed to meet the near and long-term transmission needs for the area.

Additional information regarding the need for the Project, can be found in the Company's Certificate of Need Application

3.4 PROJECT SCHEDULE

Xcel Energy anticipates a late 2014 in-service date for the Project. Construction is expected to start in late 2013. This schedule is based on information available at the date of this filing and planning assumptions that balance the timing of implementation with the availability of crews, materials and other practical considerations. This schedule may be revised as further information is developed.

3.5 PROJECT COSTS

Xcel Energy estimates that the transmission line and substation modification will cost approximately $26.1 million. Xcel Energy provides this estimate with a plus or minus 30 percent accuracy. Therefore, the total Project costs could be between $18 and $34 million.

Table 3
Project Costs

Proposed Facility Upgrades	Cost in Million $	Year
Scott County Substation termination	$1.5	2014
Westgate Substation termination	$1.3	2014
Deephaven Substation conversion	$6.3	2014
Excelsior Substation conversion	$4.4	2014
Westgate – Deephaven Line rebuild	$5.7	2014
Deephaven – Excelsior Line rebuild	$2.8	2014
Excelsior – Scott County Line rebuild	$4.1	2014
Total Cost Estimate	**$26.1**	2014

Operating and maintenance costs for the Project will be nominal for several years, since the line will be new and vegetation trimming of the corridor will occur prior to construction. Typical annual operating and maintenance costs for 115 kV transmission lines across Xcel Energy's Upper Midwest system area are on the order of $300 to $500 per mile of transmission right-of-way. The principal operating and maintenance cost will include inspections, which are usually done by fixed-wing aircraft and by helicopter on a regular basis (typically quarterly and annually respectively).

The Company performs periodic inspections of substations and equipment. The type and frequency of inspection varies depending on the type of equipment. Typical inspection intervals are semi-annual or annual. Maintenance and repair are performed on an as-needed basis, and therefore the cost varies from substation to substation.

4.0 FACILITY DESCRIPTION AND ROUTE SELECTION RATIONALE

4.1 TRANSMISSION LINE DESCRIPTION

The Project involves converting the existing double circuit 115/69 kV transmission line (Line #5516/#0734) between the Scott County Substation and Structure #57 to 115/115 kV operation. This section of double circuit line was permitted locally for 115/115 kV operation. Conversion to 115/115 kV operation will not require the rebuilding or replacement of any existing structures. The Proposed Route for the 115/69 kV conversion follows existing transmission rights-of-way for its entire 5.3 mile length.

The Project also involves removing the existing single circuit 69 kV line (Line #0734) between Structure #57 on Line #5516 and the Westgate Substation and replacing it with a single circuit 115 kV transmission line. As a result, the Proposed Route for the rebuilt 69 kV transmission line follows existing transmission line rights-of-way for its entire length of 20 miles.

A detailed description of the Proposed Route is provided in **Table 4**. **Figure 2** provides an overview of the Proposed Route and **Appendix B.1** provides more detail on the Proposed Route.

The Proposed Route for the conversion of the existing 115/69 kV line begins at the Scott County Substation located north of U.S. Highway 169 between the intersection of County Road 69 and Chestnut Boulevard. The route extends to the northwest from the Scott County Substation approximately 0.18 miles. The route proceeds north approximately 1.35 miles where it crosses the Minnesota River into the City of Chaska in Carver County, passing between commercial and agricultural properties. It proceeds north from the Minnesota River approximately 3.77 miles through residential and commercial development along the eastern edge of the City of Chaska, crossing Flying Cloud Drive, Highway 212, Pioneer Drive, and Lyman Boulevard and terminating at Structure #57

The Proposed Route for the 69 kV rebuild portion of the Project begins in Carver County at Structure #57 (Line #5516) located in the northeastern corner of the City of Chanhassen, approximately 0.5 miles north of the existing Bluff Creek Substation. From this point, the route extends to the north approximately 0.74 miles to Structure #47. The route continues towards the north and west approximately 0.6 miles, crossing to the north side of Minnesota Highway #5 (Arboretum Boulevard) and extending to Structure #54. The route extends north from this point, passing through a residential development approximately 1.5 miles

where the route intersects with the eastern edge of Minnesota Highway #41. The route continues to the north an additional 0.5 miles, crossing from Carver County into Hennepin County and extending to Structure #74 at the intersection of Minnesota Highway #41 and Minnesota Highway #7 located within the City of Shorewood, Minnesota. The route continues east from this point approximately 1.0 miles, paralleling the northern side of Minnesota Highway #7 passing into the City of Excelsior, Minnesota and extending to the Excelsior Substation, located at the intersection of 3rd Street and Morse Avenue.

From the Excelsior Substation the route continues to the east approximately 0.25 miles, roughly paralleling the north side of Minnesota Highway #7 to Structure #101. The route turns to the north from this point for approximately 0.8 miles, paralleling the western side of Minnetonka Boulevard, passing into the City of Greenwood, Minnesota, extending to the intersection of Minnetonka Boulevard and Fairview Street. The route extends to the north and east, paralleling the east side of Fairview Street approximately 0.5 miles to the intersection with Minnetonka Boulevard near the municipal boundary between the Cities of Greenwood and Deephaven, Minnesota. The route extends to the east from this point, paralleling Minnetonka Boulevard for approximately 1.35 miles to the Deephaven Substation, located at the intersection of Minnetonka Boulevard and Vinehill Road on the municipal boundary between the Cities of Deephaven and Minnetonka, Minnesota. The route continues to the east approximately 1.0 miles paralleling the south side of a hiking trail to Structure #175 located at the intersection of the hiking trail and Minnesota Highway #101.

The route extends south from this point approximately 1.8 miles along the western edge of Minnesota Highway #101 to Structure # 215 located in Purgatory Park. From this point, the route extends east approximately 0.5 miles to Structure #226 located at the northeastern corner of the Scenic Heights Elementary School property on the west side of Scenic Heights Drive. The route extends south approximately 0.65 miles to the intersection of Scenic Heights Drive and Hennepin County Highway #62 (Townline Road). The route extends to the west approximately 0.15 miles along the north side of Hennepin County Highway #62 (Townline Road). The route extends south from this point approximately 1.30 miles, crossing into the City of Eden Prairie, paralleling Duck Lake Road to Structure #270 located at the northwest corner of the Eden Prairie High School campus.

The route extends east across the Eden Prairie High School campus approximately 0.50 miles to Structure #280 located on the east side of Eden Prairie Road. The route extends south from this point approximately 0.25 miles to the intersection of Eden Prairie Road and Valley View Road. The route extends east along the north side of Valley View Road approximately 0.75 miles to Structure #301. The route extends south approximately 0.35

miles to the route termination point located at the Westgate Substation. Xcel Energy proposes to replace all existing structures during the rebuild of the existing 69 kV lines to single circuit 115 kV transmission lines, as described in Section 5.1.1, Structures, Right-of-Way, Construction and Maintenance. However, Structure Nos. 47-53 in Segment 2, Structure Nos. 176-193 in Segment 8, and Structure Nos. 270-280 in Segment 10 may not need to be replaced since they were recently replaced during routine maintenance efforts.

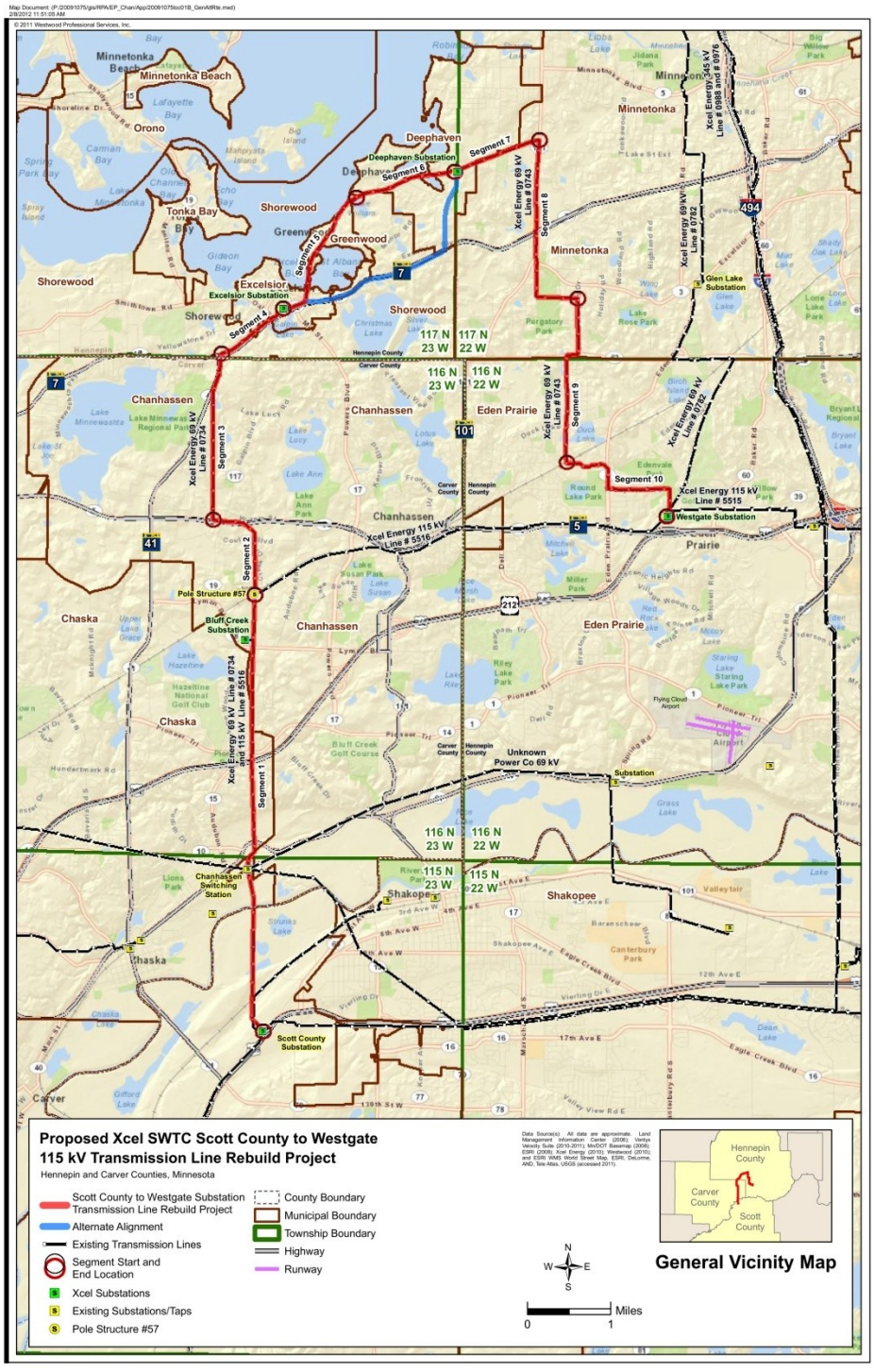
Table 4
Detailed Route Description

Route Segment	Distance	Road and Public Waters Crossing
SEGMENT 1: Convert existing 115/69 kV transmission line (Line #5516/#0734) to 115/115 kV between the Scott County Substation and Structure #57 (Line #5516)		
NORTH/NORTHWEST through agricultural/ residential/ commercial development	**5.34 miles**	**Cross Strunk Road at 0.47 mile; Cross Minnesota River at 1.55 mile; Cross Flying Cloud Drive at 2.37 mile; Cross Highway 212 at 3.34 mile; Cross Pioneer Trail at 3.44 mile; Cross Lyman Boulevard at 4.69 mile.**
SEGMENT 2: Rebuild existing 69 kV transmission line (Line #0734) to Single Circuit 115 kV between Structure #57 (Line #5516) and Structure #47 (Line #0734).		
NORTH through residential/commercial development	**0.74 miles**	**Cross Twin Cities & Western Railroad Company Rail Line at 0.02 mile; Cross Stone Creek Drive at 0.09 mile; Cross unnamed tributary of Bluff Creek as 0.20 mile; Cross Bluff Creek at 0.56 mile; Cross Coulter Boulevard at 0.66 mile.**
NORTHWEST across commercial property	**0.16 miles**	**Cross Bluff Creek at 0.15 mile; Cross State Highway 5 (Arboretum Boulevard) at 0.18 mile.**
WEST along State Highway 5 (Arboretum Boulevard)	**0.31 miles**	**Cross Galpin Boulevard at 0.18 mile.**
SEGMENT 3: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #54 (Line #0734) and State Highway 7.		
NORTH through residential development to east side of State	**1.53 miles**	**Cross West 78th Street at 0.05 mile; Cross Bluff Creek at 0.19 mile; Cross Hunter Drive at 0.59 mile; Cross Longacres Drive**

Route Segment	Distance	Road and Public Waters Crossing
Highway 41		at 0.72 mile; Cross Hoghover Trail at 1.16 mile; Cross Lake Lucy Road at 1.29 mile; Cross unnamed lake at 1.42 mile.
NORTH/NORTHEAST along east side of State Highway 41 to State Highway 7	0.46 miles	Cross Chaska Road at 0.26 mile; Cross County Boundary into Hennepin County at 0.40 mile, Cross State Highway 7 at 0.43 mile.
SEGMENT 4: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #57 (Line #5516) and Excelsior Substation.		
NORTHEAST along north side of State Highway 7	0.92 miles	Cross unnamed (Mud) lake at 0.86 mile.
SEGMENT 5: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Excelsior Substation and Structure #135 near the Greenwood/Deephaven municipal boundary.		
EAST along north side of State Highway 7	0.26 miles	Cross Morse Avenue at 0.03 mile; Cross Mill Street at 0.15 mile.
NORTH along Minnetonka Boulevard to intersection of West Street	0.81 miles	No features crossed.
NORTHEAST along Fairview Street to Structure #135 at intersection of Linwood Circle.	0.57 miles	No features crossed.
SEGMENT 6: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #135 near the Greenwood/Deephaven municipal boundary and the Deephaven Substation.		
EAST along north side of Minnetonka Boulevard	0.38 miles	No features crossed.
NORTHEAST along pedestrian trail	0.29 miles	Cross Minnetonka Boulevard at 0.29 mile.
EAST along south side of Minnetonka Boulevard to Deephaven Substation	0.67 miles	Cross Carson Bay of Lake Minnetonka at 0.31 mile; Cross Vinehill Road at 0.65 mile.
SEGMENT 7: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between		

Route Segment	Distance	Road and Public Waters Crossing
Deephaven Substation and Structure #175 at intersection of Hennepin County Road #101.		
NORTH EAST along south side of pedestrian trail	**1.00 mile**	**Cross 106th Street at 0.2 mile**
SEGMENT 8: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #175 at intersection of Hennepin County Road #101 and Structure #226 at intersection of Scenic Heights Drive.		
SOUTH	**1.9 miles**	**Cross State Highway 7 at 1.10 mile; Cross from west to east side of State Highway 7 at 1.40 mile; Cross Excelsior Boulevard at 1.48 mile.**
EAST	**0.50 miles**	**Cross Purgatory Creek at 0.10 mile.**
SEGMENT 9: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #226 at intersection of Scenic Heights Drive and Structure #270 at northwest corner of the Eden Prairie High School Campus.		
SOUTH	**0.65 miles**	**Cross Purgatory Creek at 0.49 mile**
WEST along north side of Hennepin County Road #62 (Townline Road)	**0.14 miles**	**No features crossed.**
SOUTH along Duck Lake Road	**1.30 miles**	**Cross Hennepin County Road #62 (Townline Road) at 0.01 mile; Cross from east to west side of Duck Lake Road at 0.70 mile; Cross Duck Lake Trail at 0.84 mile; Cross Duck Lake at 1.03 mile; Cross Twin Cities & Western Railroad Company Rail Line at 1.28 mile;**
SEGMENT 10: Rebuild existing 69 kV transmission line to Single Circuit 115 kV – between Structure #270 at northwest corner of the Eden Prairie High School Campus and the Westgate Substation.		
EAST	**0.53 miles**	**Cross the Eden Prairie Road at 0.52 mile.**
SOUTH along east side of Eden Prairie Road	**0.25 miles**	**No features crossed.**
EAST along north side of Valley View Road	**0.73 miles**	**Cross Purgatory Creek at 0.72 mile.**
SOUTH	**0.32 miles**	**Cross Valley View Road at 0.01 mile; Cross pedestrian trail at 0.30 mile.**

Figure 2
Proposed Route



4.2 ROUTE WIDTH AND ALIGNMENT SELECTION PROCESS

The Proposed Route for the Project was developed by the Company's permitting and engineering personnel based on their investigation of the overall Project Area and input from government entities and the public. The Company also performed an analysis of environmental resources in the Project Area by using computer mapping aerial photographs and topographic maps. Environmental resources identified within the Project Area are discussed in Sections 6.5 and 6.6 of this Application. A list of wildlife species that is representative of the Project Area is contained in **Appendix C**. The Proposed Route is designed to best minimize the overall impacts of the Project.

On May 17, 2010, January 20, 2011, and January 13, 2012, Xcel Energy provided Project information and requested comments from Local Government Units ("LGUs") located within the Project Area. See Section 7.1 and **Appendix D** of this Application for additional information.

Two public open house meetings were held by Xcel Energy in January of 2011. The first was held at the Eden Prairie Community Center in Eden Prairie, Minnesota on January 10, 2011. The second was held at the Bayview Event Center in Excelsior, Minnesota on January 13, 2011. Xcel Energy published notice of the open house meeting on December 30, 2010. See **Appendix E.2**. Approximately 80 people attended these open house meetings. See **Appendix E.3**. The attendees focused primarily on the structure design details of the proposed Project and the extent of vegetation trimming required for the Project.

The proposed transmission line locations were developed with the following primary objectives:

- Maximize use of existing transmission line alignments and rights-of-way;
- Minimize impacts to residences;
- Minimize use of new right-of-way; and
- Minimize impacts to environmental and sensitive resources.

The Company believes the Proposed Route for the Project best meets the objectives stated above.

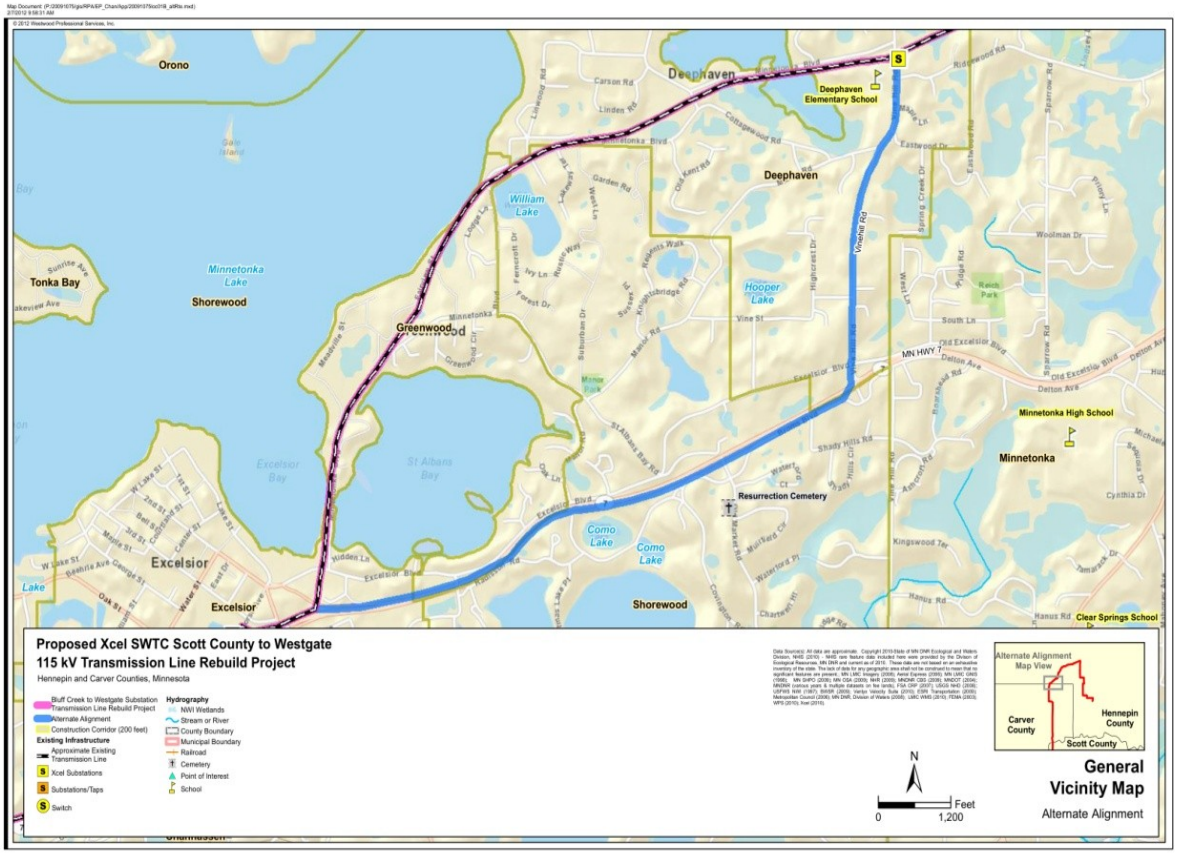
In particular, the Proposed Route maximizes the use of existing transmission line corridors – the Project uses existing transmission rights-of-way for all 20 miles of its length. The use of existing transmission line corridors was an important factor for this Project because using existing corridors reduces transmission line proliferation and impacts to new residences.

The Proposed Route also minimizes impacts to environmental and sensitive resources. Xcel Energy requests a route width of 100 feet on each side of the existing 69 kV and 115/69 kV facilities route centerline (200 feet total width).

4.3 ALTERNATIVE SEGMENTS CONSIDERED AND REJECTED

In evaluating the route for the proposed Project, Xcel Energy focused predominantly on the right-of-way of existing transmission lines because it minimizes new environmental impacts and maximizes the use of existing utility corridors. Xcel Energy also evaluated a route alternative that follows State Highway 7 ("Highway 7") and Vinehill Road in response to public comments received during the public meetings and prior to filing this Application regarding the proposed Project ("Highway 7 Alternative") (*See* **Figure 3**). **Appendix B.1, General Vicinity Maps Segments 5 and 6 and Appendix B.4, Detailed Environmental Features Mapbook For Alternate Route** provide further map details of the Highway 7 Alternative.

Figure 3
Highway 7 Alternative



Highway 7 Alternative: New 115 kV Transmission Line adjacent to Highway 7 and Vinehill Road.

The Highway 7 Alternative is an alternate route that would be used instead of Segments 5 and 6 of the Proposed Route. The Highway 7 Alternative extends along the Highway 7 corridor for approximately 2.0 miles from the intersection of Highway 7 and Morse Avenue at the west end to the intersection of Highway 7 and Vinehill Road. At this point it proceeds north adjacent to Vinehill Road for 0.8 miles to a point south of the intersection with Minnetonka Boulevard. The total length of the Highway 7 Alternative is 2.81 miles compared to 2.97 miles for Segments 5 and 6 combined.

The main difference between the Proposed Route and the Highway 7 Alternative is that the Highway 7 Alternative would require the construction of a new 115 kV transmission line along all new right-of-way. As a result, all impacts associated with the Highway 7 Alternative would be new impacts; whereas the impacts associated with the Proposed Route within Segments 5 and 6 would be incremental because they utilize existing transmission line

right-of-way. **Table 5** below compares the percentage of right-of-way sharing between the proposed route segments 5 and 6 and the Highway 7 Alternative.

Table 5
Comparison of Right-of-Way Sharing

Criteria	Proposed Route Segments 5 and 6	Highway 7 Alternative
Length (miles)	2.97	2.81
Percent of route sharing existing transmission line right-of-way	100%	0%
Percent of route paralleling road right-of-way	100%	100%

Because the Highway 7 Alternative would require the establishment of new transmission line right-of-way, this alternative would require more clearing of trees and vegetation than the Proposed Route. While portions of the Highway 7 Alternative have distribution structures, such as on Vinehill Road, the transmission structures would require greater clearances and as a result, more tree and vegetation clearing than Segments 5 and 6 of the Proposed Route. **Figure 4** below shows the existing distribution line along Vinehill Road and the extensive amount of trees and other vegetation that would need to be cleared if this route alternative is selected. The total acreage of full canopy cover was calculated along the Highway 7 Alternate. A total of 8.9 acres of wooded area would have to be cleared to accommodate a new transmission line along the Highway 7 Alternative. **Figure 5** below shows a portion of Segment 6 along the Company's Proposed Route which follows an existing 69 kV transmission line corridor. As **Figure 5** shows, the trees and vegetation are already cleared along this existing 69 kV transmission line right-of-way, therefore, no additional wooded areas would require clearing for Segments 5 and 6 of the Proposed Route.

Figure 4
Photographs of the Existing Distribution Line
Along Vinehill Road

Figure 5
Photograph of Existing Cleared Transmission Line Corridor
Along Segment 6 of the Proposed Route

In addition, if the Highway 7 Alternative is selected, the existing 69 kV transmission line in Segments 5 and 6 would not be removed. The Company would continue to maintain the existing transmission line for possible future distribution or transmission uses for this area.

A comparison between the Highway 7 Alternative and Segments 5 and 6 of the Proposed Route was done for occupied structures. To compare the number of occupied structures for both routes, the Company developed a potential alignment for the Highway 7 Alternative and measured impacts from this proposed alignment. The proposed alignment is shown in the detailed maps in **Appendix B.4**. The potential impacts to residences and commercial buildings is comparable for Segments 5 and 6 of the Proposed Route and the Highway 7 Alternative. With regard to existing structures, a total of 62 residences and 21 commercial businesses are located within 200 feet of the Highway 7 Alternative, compared to 68 residences, and 17 commercial businesses within 200 feet of Proposed Route Segments 5 and 6 combined. **Table 6** compares the distance to occupied structures between Segments 5 and 6 of the Proposed Route with those of the Highway 7 Alternative. Again it is important to note that the impacts to occupied structures along the Highway 7 Alternative would be new impacts while the Proposed Route follows the right-of-way of an existing 69 kV line.

Table 6
Comparison of Distances to Occupied Structures Along Proposed Route Versus Highway 7 Alternative Route Segments

Route	Number of Residences within 0-25'	Number of Commercial Operations within 0-25'	Number of Residences within 26-50'	Number of Commercial Operations within 26-50'	Number of Residences within 51-100'	Number of Commercial Operations within 51-100'	Number of Residences within 101-200'	Number of Commercial Operations within 101-200'
Proposed Route Segments 5 & 6	0	3	1	3	19	5	48	7
Highway 7 Alternative	0	2	0	1	14	7	48	11

Because Segments 5 and 6 of the Proposed Route would follow an existing 69 kV transmission line route, the Project will have nominal effects on the visual and aesthetic character of the area. All aesthetic impacts associated with the Highway 7 Alternative would be new. Also, as noted above, the Highway 7 Alternative would require vegetation and tree clearing to accommodate the proposed transmission line.

The Company believes that use of Segments 5 and 6 of the Proposed Route is preferable to the Highway 7 Alternative because:

- The Proposed Route maximizes the use of existing utility right-of-way compared to the Highway 7 Alternative (100% vs. 0%);

- The Proposed Route minimizes the use of new transmission line right-of-way compared to the Highway 7 Alternative (0% vs. 100%);

- The Highway 7 Alternative would require greater vegetation and tree clearing compared to the Proposed Route;

- The Highway 7 Alternative would not eliminate the existing 69 kV transmission line corridor along Segments 5 and 6 of the Proposed Route;

- The Highway 7 Alternative would require the establishment of new right-of-way and the acquisition of new easements from both MnDOT and private entities for the length of the route;

- There are existing frontage roads at several locations along this particular stretch of Highway 7 that would necessitate placing the line closer to residential areas to secure sufficient space to accommodate the new line; and

- Existing infrastructure along Highway 7 would also necessitate several crossings of Highway 7.

Therefore, the Company does not believe that the Highway 7 Alternative is a prudent alternative to the Proposed Route along Segments 5 and 6. If the Highway 7 Alternative is selected by the Commission, however, the Company would request a route width of 1,000 feet to enable the Company to design an alignment given the significant amount of existing infrastructure in this area.

4.4 SUBSTATION MODIFICATIONS

4.4.1 Scott County Substation

The existing Scott County Substation will be modified as part of the Project. All modifications to the existing Scott County Substation will take place on Xcel Energy property. The existing line termination for the line to Excelsior Substation that is 115 kV

capable but operating at 69 kV will be removed from the 69 kV bus within the Scott County Substation and relocated to the 115 kV bus.

A new 115 kV portion of the substation to tie in a 115 kV line from West Waconia Substation will already be in place and this project will be tying into the 115 kV structures in that area. The line will terminate on the north end of an existing 115 kV box structure in the new 115 kV yard.

Equipment that will be installed include one new 145 kV (operated at 115 kV) circuit breaker, and associated electrical equipment, such as switches, to accommodate the new 115 kV line.

Preliminary plans for the Scott County Substation are attached in Appendix G.1.

4.4.2 Excelsior Substation Modifications

The existing Excelsior Substation will be modified as part of the Project. The existing Excelsior Substation is a 69-13.8 kV distribution substation that will be partially demolished and replaced with a new 115-13.8 kV distribution substation. The existing fence will be replaced with a new seven-foot tall fence with a one-foot topper of barbed wire on a 45° outrigger. The new fence will be grounded and counterpoised.

New 115 kV steel structures will be erected and new 115 kV equipment will be installed. 115 kV equipment additions at the existing Excelsior Substation include one 115-13.8 kV, 28 MVA transformer, one 115 kV circuit interrupter, and associated electrical equipment, such as switches, to accommodate the new 115 kV line.

The existing 69-13.8 kV, 19 MVA transformer, two 69 kV oil circuit breakers, the 69 kV capacitor bank, the 69 kV circuit interrupter, and associated electrical equipment, such as switches, and the existing 69 kV and 4 kV steel structures will be removed. The existing distribution structures will remain.

In order to fit the new 115 kV equipment on the substation property, the old generating plant building (which has an area dedicated as a control room for the existing transmission and distribution protection) will be demolished. A new 24'x40' Electrical Equipment Enclosure will be installed for the new control and protection equipment installed during the voltage conversion project.

Future plans for the substation include the installation of a second 118-13.8 kV, 28 MVA transformer, one 115 kV circuit interrupter, one 145 kV (operated at 115 kV) circuit breaker, and associated 115 kV equipment, such as switches, and two 13.8 kV distribution feeders (including new steel structures, circuit breakers, voltage regulators, and associated equipment, such as switches).

Preliminary plans for the Excelsior Substation are attached in Appendix G.2.

4.4.3 Deephaven Substation Modifications

The existing Deephaven Substation will be modified as part of the Project. The existing Deephaven Substation is a 69-13.8 kV distribution substation that will be partially demolished and replaced with a new 115-13.8 kV distribution substation. To facilitate the new 115 kV yard and distribution transformers, an area approximately 40' x 115' to the south of the existing substation and an irregularly shaped area approximately 20' x 115' x 105' outside of the existing north and northeast fence-line will be cleared of trees, graded, and fenced. In addition, the existing fence will be replaced with a new seven-foot tall fence with a one-foot topper of barbed wire on a 45° outrigger. The new fence will be grounded and counterpoised.

115 kV equipment additions at the existing Deephaven Substation will include two 118-13.8 kV, 50 MVA transformers, two 115 kV circuit interrupters, one 145 kV (operated at 115 kV) circuit breaker, and associated electrical equipment, such as switches, to accommodate the new 115 kV line. The existing 69-13.8 kV, 28 MVA transformers, 69 kV circuit interrupters, and associated 69 kV and 15 kV switches and the existing 69 kV steel structures will be removed. The existing distribution structures will remain and additional 115 kV steel structures and electrical equipment will be installed to accommodate the new 115-13.8 kV transformation.

The existing Electrical Equipment Enclosure will be removed and a new 24' x 40' Electrical Equipment Enclosure will be installed for the new control and protection equipment installed during the voltage conversion.

Future plans for the substation include the installation of up to four additional 13.8 kV distribution feeders (including new steel structures, circuit breakers, voltage regulators, and associated equipment, such as switches).

Preliminary plans for the Deephaven Substation are attached in Appendix G.3.

4.4.4 Westgate Substation

The existing Westgate Substation will be modified as part of the Project. The existing 69 kV line to Excelsior Substation will be removed and a new 115 kV line to Excelsior Substation will be terminated at Westgate Substation. The existing 69 kV box structure will be used as a pass through structure for the converted line. In order for this to work, the upgraded line will terminate on the 69 kV structure on the west side rather than the south side where the 69 kV line presently terminates.

Equipment that will be installed include two 145 kV (operated at 115 kV) circuit breakers, and associated electrical equipment, such as switches, to accommodate the new 115 kV line. One existing 115-69 kV, 47 MVA transformer, one 69 kV breaker, and associated electrical equipment, such as switches, will be removed.

Preliminary plans for the Westgate Substation are attached in Appendix G.4.

4.5 DESIGN OPTIONS TO ACCOMMODATE FUTURE EXPANSION

The proposed 115 kV and 115/115 kV transmission lines are designed to meet current and projected needs. The proposed substation modifications are designed to provide for interconnection with proposed, existing, and potential future transmission facilities.

5.0 ENGINEERING DESIGN, CONSTRUCTION AND RIGHT-OF-WAY ACQUISITION

5.1 STRUCTURES, RIGHT-OF-WAY, CONSTRUCTION AND MAINTENANCE

5.1.1 Transmission Structures

Steel poles with horizontal braced post insulators are proposed to be used for the majority of the 115 kV single circuit rebuild transmission line. Other structure types that may be used along the rebuild route include horizontal post, H-frame, and Y-frame structures. For Segments 7-10, a cantilever design may be used. This design would require installation of a single pole transmission structure with all davit arms and conductors installed on the side of the pole that overhangs the public road or public right-of-way. Pictures of the proposed structure types are shown below in **Figure 6**.

Portions of the existing 69 kV transmission line between Structure #57 and the Westgate Substation have distribution underbuild. In locations where the Proposed Route can be constructed with the existing distribution line, the structures will be single circuit 115 kV poles with distribution underbuild.

Some of the existing structures along the 69 kV rebuild portion of the Project will not need to be replaced. For instance, Structure Nos. 47-53 in Segment 2, Structure Nos. 176-193 in Segment 8, and Structure Nos. 270-280 in Segment 10 may not need to be replaced since they were recently replaced during routine maintenance efforts.

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.

The existing 115/69 kV transmission line between the Scott County Substation and Structure #57 utilizes double circuit structures. These structures will remain in place when this line is converted to 115/115 kV operation. No physical modification of the existing transmission line or structures will be required to complete the conversion to 115/115 kV operation. A picture of typical double circuit 115/115 kV structure is shown below in **Figure 6**.

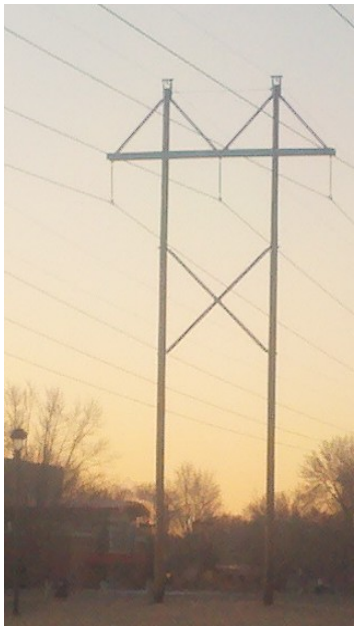
Figure 6
Photos of Typical 115 kV Single Circuit and 115/115 kV Double Circuit Structures

Typical 115 kV Braced Post Structure

Typical Y-Frame Steel Structure

Typical 115 kV Horizontal Post Steel Structure

Typical 115 kV Single Circuit Cantilever Design



Typical H-Frame Steel Structure

Typical 115/115 kV Steel Davit Arm Structure

Typical Single Circuit 115 kV Structure with Distribution Underbuild

The steel structures proposed for the 69 kV to 115 kV rebuild will be approximately 60 to 90 feet tall with spans of approximately 200 to 400 feet for post structures and 400 to 900 feet for H-frame and Y-frame structures. This spacing is appropriate to keep the conductor within existing right-of-ways where applicable. **Table 7** summarizes the structure design for the line.

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 Conductor Steel Supported ("ACSS").

Table 7
Structure Design Summary

Line Type	Structure Type	Structure Material	Right-of-Way Width (feet)	Structure Height (feet)	Foundation	Foundation Diameter (feet)	Span Between Structures (feet)
115 kV Single Circuit	Single pole, horizontal post or horizontal braced post insulator	Galvanized steel or weathering steel	75	60-90	Direct embedded for tangents and self-supporting for angle/ dead-end structures	Direct embedded in 4 foot diameter culvert or 5 to 8 foot concrete	200 to 400
115 kV Single Circuit	Two pole, H-Frame or Y-Frame	Galvanized steel or weathering steel	75	60-90	Direct embedded for tangent H-Frame and self-supporting for Y-Frame or angle/ dead-end structures	Direct embedded in 4 foot diameter culvert or 5 to 8 foot concrete	400 to 900
115 kV Single Circuit with Distribution Underbuild	Single pole, horizontal post or braced post with distribution crossarm	Galvanized Steel or Weathering Steel	75	70 to 110	Direct embedded for tangents and self-supporting for angle/ dead-end structures	Direct embedded in 4 foot diameter culvert or 5 to 8 foot concrete	300 to 500
115 kV Single Circuit	Single pole, horizontal post or braced post with vertical configuration (Cantilever design)	Galvanized Steel or Weathering Steel	25 feet on side of arm and conductors*	70-100	Direct embedded for tangents and self-supporting for angle/ dead-end structures	Direct embedded in 4 foot diameter culvert or 5 to 8 foot concrete	200 to 400

*The Company may also seek to acquire right-of-way on the non-arm aide of the poles for access and maintenance of the structures of between 25 to 37.5 feet where feasible.

5.1.2 Right-of-Way Width

Xcel Energy will construct the 115 kV rebuild within the existing right-of-way maintained for the 69 kV line. When necessary, blanket easements may be modified up to a 75-foot width along the rebuild portions of the Project. If a cantilever design is used for Segments 7-10, Xcel Energy will seek a 25-foot right-of-way on the side of the pole with the cantilevered arms and conductors and may seek to acquire a right-of-way on the non-arm side of the poles for access and maintenance of the structures of between 25 and 37.5 feet where feasible.

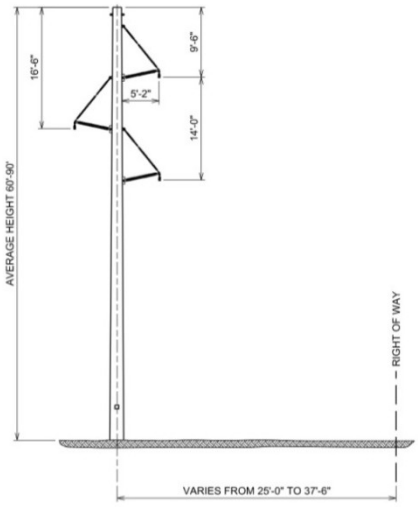
The conversion of the existing double-circuit 115/69 kV to 115/115 kV voltage will not require any additional right-of-way as no physical modification of the existing transmission line is required. Xcel Energy typically requires a right-of-way width up to 75 feet wide for the construction of new 115 kV transmission lines.

Figure 7 shows the pole dimensions and general right-of-way requirements for the line.

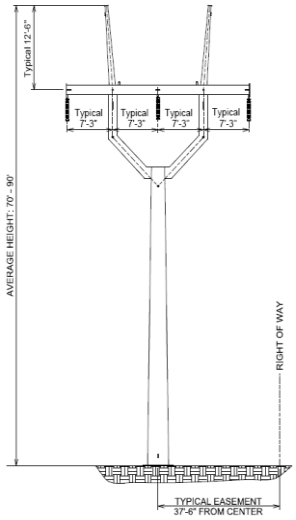
For the proposed Project, approximately 11.3 miles of the 20.0 miles (57%) will be parallel to existing roadways and trails, and approximately 8.7 miles (43%) will be cross country transmission lines. When the transmission line parallels other existing infrastructure right-of-way (e.g., roads, railroads, other utilities), an easement of lesser width may be required as part of the right-of-way for the transmission line can often be combined with the right-of-way of the existing infrastructure. With this pole placement, the transmission line shares the existing infrastructure right-of-way, thereby reducing the size of the easement required from a private landowner. In some locations, structures along the existing 69 kV transmission line are located within road right-of-way. In these locations, the Company proposes to place the new 115 kV structures also in road right-of-way.

If a route alternative is selected that does not utilize the existing 69 kV transmission line corridor, new right-of-way will be required. In this instance, when the transmission line is parallel to a roadway, poles will generally be placed 5 feet outside roadway right-of-way. Therefore, a little less than half of the line right-of-way will share the existing road right-of-way, resulting in an easement of lesser width being required from the landowner. The amount of new easement required will depend on the road configuration and the distance between the road and the transmission line. In general, the structures will be placed as close to the property line as practical. Xcel Energy will work with industry standard practices and the Minnesota Department of Transportation's ("MnDOT") accommodation policy.

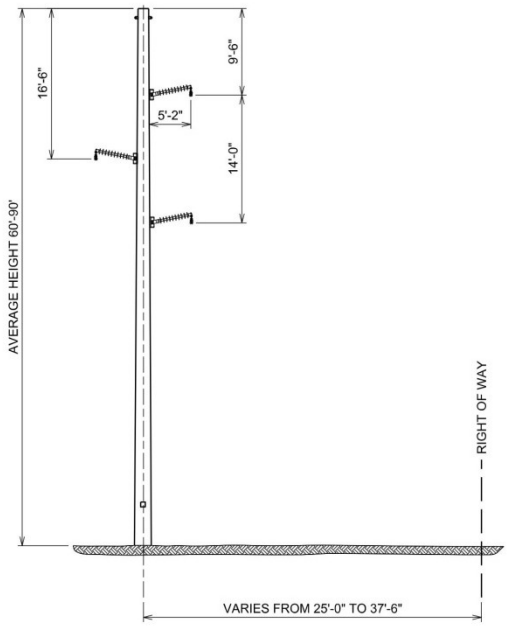
Figure 7
Typical Dimensions and Right-of-Way Requirements for Proposed Structures



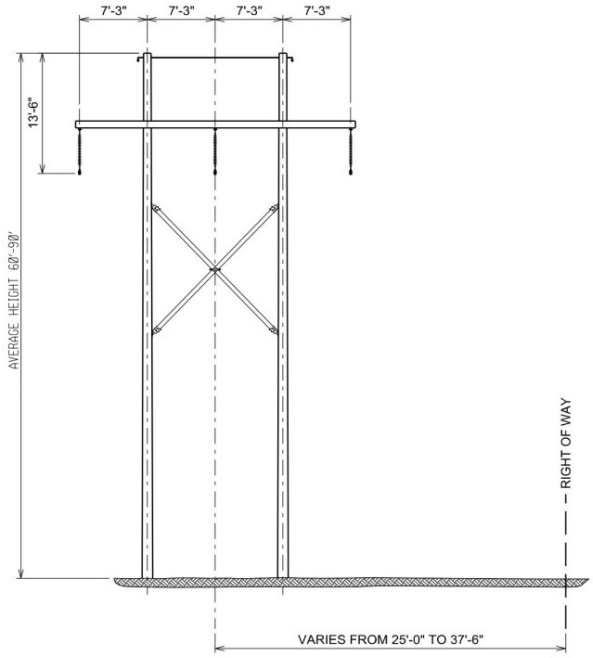
115 kV Braced Post Structure



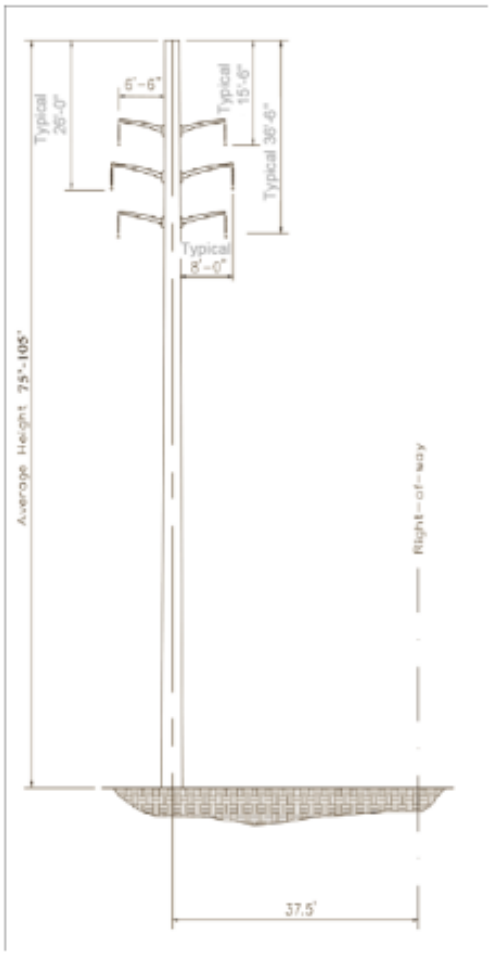
115 kV Y-Frame Structure



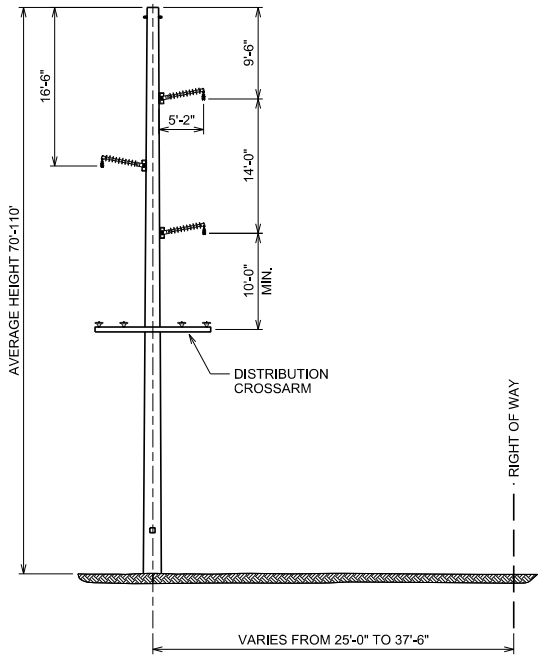
115 kV Horizontal Post Structure



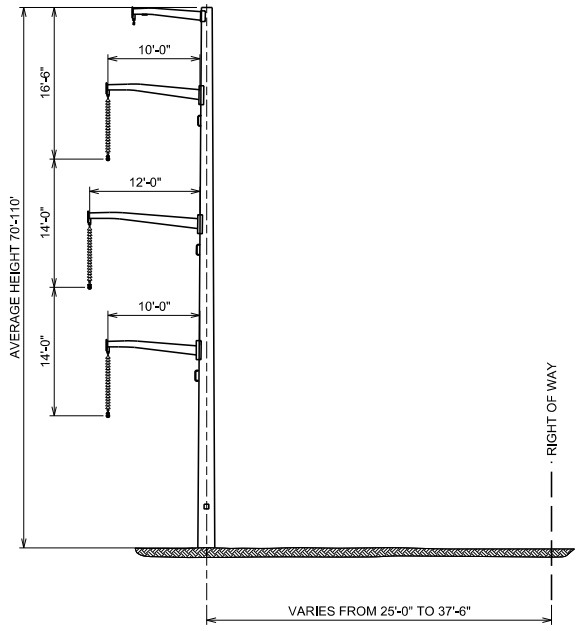
115 kV H-Frame Structure



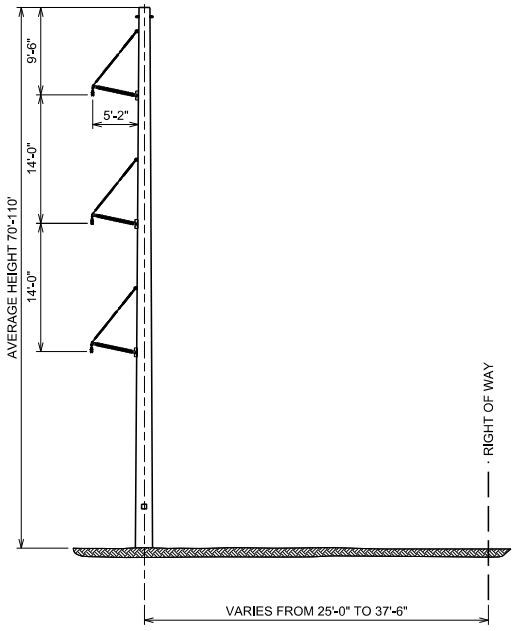
Double Circuit 115/115 kV Davit Arm Structure



Single Circuit 115 kV Structure with Distribution Underbuild



Single Circuit 115 kV Davit Arm Structure with Cantilever Design



Single Circuit 115 kV Braced Post Structure with Cantilever Design

5.1.3 Right-of-Way Evaluation and Acquisition

To the extent new right-of-way acquisition is necessary, the right-of-way agent will work with landowners to determine how to expand existing easements.

For those segments of the Project where new right-of-way will be necessary, the acquisition process begins early in the detailed design phase. For transmission lines, utilities acquire easement rights across certain parcels to accommodate the facilities. The evaluation and acquisition process includes title examination, initial owner contacts, survey work, document preparation and purchase. Each of these activities, particularly as it applies to easements for transmission line facilities, is described in more detail below.

The first step in the right-of-way process is to identify all persons and entities that may have a legal interest in the real estate upon which the facilities will be built. To compile this list, a right-of-way agent or other persons engaged by the utility will complete a public records search of all land involved in the project. A title report is then developed for each parcel to determine the legal description of the property and the owner(s) of record of the property, and to gather information regarding easements, liens, restriction, encumbrances and other conditions of record.

After owners are identified, a right-of-way representative contacts each property owner or the property owner's representative. The right-of-way agent describes the need for the transmission facilities and how the Project may affect each parcel. The right-of-way agent also seeks information from the landowner about any specific construction concerns.

The next step in the acquisition process is evaluation of the specific parcel. For this work, the right-of-way agent may request permission from the owner for survey crews to enter the property to conduct preliminary survey work. Permission may also be requested to take soil borings to assess the soil conditions and determine appropriate foundation design. Surveys are conducted to locate the right-of-way corridors, natural features, man-made features and associated elevations for use during the detailed engineering of the line. The soil analysis is performed by an experienced geotechnical testing laboratory.

During the evaluation process, the location of the proposed transmission line or substation facility may be staked with permission of the property owner. This means that the survey crew locates each structure or pole on the ground and places a surveyor's stake to mark the structures or substation facility's anticipated location. By doing this, the right-of-way agent can show the landowner where the structure(s) will be located on the property. The right-of-way agent may also delineate the boundaries of the easement area required for safe operation of the line.

Prior to the acquisition of easements or fee purchase of property, land value data will be collected. Based on the impact of the easement or purchase to the market value of each parcel, a fair market value offer will be developed. The right-of-way agent then contacts the property owner(s) to present the offer for the easement and discuss the amount of just compensation for the rights to build, operate and maintain the transmission facilities within the easement area and reasonable access to the easement area. The agent will also provide maps of the line route or site, and maps showing the landowner's parcel. The landowner is allowed a reasonable amount of time to consider the offer and to present any material that the owner believes is relevant to determining the property's value. This step is often performed prior to full evaluation in the form of an "option to purchase" contract and can be very helpful in obtaining permission for completion of all necessary evaluations.

In nearly all cases, utility companies are able to work with the landowners to address their concerns and an agreement is reached for the utility's purchase of land rights. The right-of-way agent prepares all of the documents required to complete each transaction. Some of the documents that may be required include: easement; purchase agreement; contract; and deed.

In rare instances, a negotiated settlement cannot be reached and the landowner chooses 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 Minnesota Statutes, Chapter 117. The process of exercising the right of eminent domain is called condemnation.

Before commencing a condemnation proceeding, the right-of-way agent must obtain at least one appraisal for the property proposed to be acquired and a copy of that appraisal must be provided to the property owner. Minn. Stat. § 117.036, subd. 2(a). The property owner may also obtain another property appraisal and the company must reimburse the property owner for the cost of the appraisal according to the limits set forth in Minnesota Statute § 117.036, Subd. 2(b). The property owner may be reimbursed for reasonable appraisal costs up to $1,500 for single-family and two-family residential properties, $1,500 for property with a value of $10,000 or less, and $5,000 for other types of properties.

To start the formal condemnation process, a utility files a Petition in the district court where the property is located and serves that Petition on all owners of the property. If the court grants the Petition, the court then appoints a three-person condemnation commission that will determine the compensation for the easement. The three people must be knowledgeable of applicable real estate issues. Once appointed, the commissioners schedule a viewing of the property over and across which the transmission line easement is to be located. Next, the commission schedules a valuation hearing where the utility and landowners can testify as to the fair market value of the easement or fee. The commission then makes an award as to the value of the property acquired and files it with the court. Each party has 40 days from the filing of the award to appeal to the district court for a jury trial. In the event of an appeal, the jury hears land value evidence and renders a verdict. At any point in this process, the case can be dismissed if the parties reach a settlement.

As part of the right-of-way acquisition process, the right-of-way agent will discuss the construction schedule and construction requirements with the owner of each parcel. To ensure safe construction of the line, special consideration may be needed for fences, crops or livestock. For instance, fences may need to be moved, temporary or permanent gates may need to be installed; crops may need to be harvested early; and livestock may need to be moved. In each case the right-of-way agent and construction personnel coordinate these processes with the landowner.

Where the Project is expected to use existing rights-of-way, the right-of-way agent will evaluate all existing easements. If the terms of the existing easement are sufficient and no

new right-of-way is needed, the right-of-way agent will continue to work with the landowner to address any construction needs, impacts, damages or restoration issues.

5.1.4 Vegetation Removal Procedures Prior to Construction

The primary objective of the vegetation removal procedure for the Project is to keep transmission facilities clear of tall growing trees, brush, and other vegetation that could grow close to the conductors, and allow construction vehicle access to and between structures. Wherever feasible, Xcel Energy tries to manage vegetation within our right-of-way using the wire zone/border zone concept (*See* **Appendix H**). This concept generally allows for different, yet compatible, vegetation types in these separate zones. The wire zone, directly beneath the conductors, consists of low growing forbs and grasses. The border zone begins at the outside edge of the wire zone and extends to the edge of the easement. The border zone may contain additional low-growing woody plants and trees. Xcel Energy will attempt to limit vegetation removal along the existing corridor to the extent of what has historically been cut to maintain the current 69 kV line.

The following provides a list of general practices Xcel Energy will follow to minimize vegetation impacts related to Project construction.

- Minimize rutting by using matting materials in wetland areas for all construction activities, including right-of-way clearing activities; or perform work on firm or frozen ground that can support the equipment used.
- Minimize soil disturbance in steeply sloped areas, to the extent possible and/or practicable.
- Limit construction activities, including vegetation removal, to the right-of-way and off right-of-way access.
- Selectively retain some vegetation within the right-of-way where feasible.
- Limit traffic in the right-of-way between transmission structure locations to a single access path to the extent practicable.
- Use best management practices (BMPs) to minimize the potential for spills or leaks from equipment during construction, including frequent inspections of equipment, requiring portable spill containment kits for construction equipment, ensuring that equipment operators are present at the nozzle at all times when fueling is in progress, and prohibiting the refueling of equipment in wetlands.
- Avoid placement of staging or laydown areas in wetlands, and immediately adjacent to wetlands to the extent practicable.
- Limit staging and lay-down areas to previously disturbed areas where practicable.

- Locate, design, construct, and maintain access paths to minimize rutting, maintain surface and subsurface water flows in the wetland, and reduce erosion and sedimentation.
- Where wetlands are to be crossed, create access through the shortest route within the wetland resulting in the least amount of physical impact to the wetland during construction.
- Assemble structures on upland areas before transporting into wetlands where practicable.
- Use construction mats to minimize impacts within wetlands when construction during winter (frozen) months is not possible.
- Slash or woody vegetation that originates from outside wetlands is not to be left in wetlands. Slash or woody vegetation that originates from outside the wetland is considered unauthorized fill and must be removed.
- To the extent practicable, complete construction in wet organic soils when the ground is frozen.

Site Clean-Up and Restoration

As construction wastes are generated, respective materials will be properly disposed of in a manner which is suitable and appropriate for those wastes. Restoration of the natural landscape will begin as soon as construction or clearing activities cease. Restoration activities may include:

- Regrading areas disturbed by construction or clearing to reflect pre-construction topography.
- Return floodplain contours to their pre-construction profile if disturbed during construction.
- Plant or seed non-agricultural areas disturbed by transmission line structures to prevent runoff. Use native seed mixes from indigenous plants; ensure seeding and/or plantings are done at a time congruent with seeding and growth of the area, not during a time that would preclude germination or rooting.
- Restore the right-of-way, temporary work spaces, access paths, and other areas of ground disturbance affected by Project construction upon completion of work.

Vegetation Removal

The Project will require the clearing of tall vegetation within the right-of-way and clearing of brush along temporary construction access paths. Tall growing vegetation that may interfere with safe construction and safe and reliable operation of the transmission line will not be

allowed to persist and will be controlled. In upland areas, woody vegetation will be removed within the right-of-way and managed through the operational life of the Project.

Clearing of vegetation within the right-of-way will occur prior to construction activities as allowed by landowner agreements and permit conditions. Clearing of brush, trees, and herbaceous vegetation to facilitate access and to meet safety standards will occur. Clearing may be accomplished with the use of chainsaws, mowers, and hydraulic tree-cutting equipment. Vegetation will be cut at, or slightly above, the ground surface. Rootstock or stumps will be left in place unless transmission structure installation or construction access requires otherwise.

Landowners will be notified at the earliest possible time to allow them to harvest trees within easement boundaries prior to the initiation of clearing. At the time of clearing, any merchantable trees will be cut to standard logging lengths and stacked in upland areas within the right-of-way. The landowner will retain the title to all timber material. Non-merchantable material, including trees, brush, and slash, will be either cut and scattered, placed in windrow piles, or chipped within the right-of-way. Non-merchantable felled material may also be removed from the right-of-way.

The cut and scatter method may be used in areas where limited clearing will occur in either wetlands or uplands. The purpose of this method is to limit the need for unnecessarily hauling and potentially disturbing existing ground or vegetation. Likely situations where this method will be used are in shrub and brush areas with a limited numbers of trees. Limited numbers of trees in shrub wetlands may be disposed of in this way as long as trees that are cut and scattered originate within the wetland. No upland tree material is to be deposited within wetlands as this would constitute wetland fill, which is prohibited.

Woody vegetation may be chipped and scattered over the right-of-way to a maximum depth of one inch in non-agricultural upland areas. Chipping will not occur in wetlands, with the exception of chipped material that is evenly scattered through the use of rubber-tracked blade mowers or ASV Posi-Track mower type equipment used to clear small diameter trees and shrubs.

5.1.5 Transmission Construction Procedures

Construction will begin after all federal, state, and local approvals are obtained, property and rights-of-way are acquired, soil conditions are determined and the design is completed. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, available workforce and materials.

The actual construction will follow standard construction and mitigation practices that have been developed from experience with past projects. These best practices address right-of-way clearance, staging, erecting transmission line structures and stringing transmission lines. Construction and mitigation practices to minimize impacts will be developed based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain and other practices. In certain cases some activities, such as schedules, are modified to minimize impacts to sensitive environments.

Typical construction equipment used on transmission projects includes: tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers.

Steel poles are proposed to be used for the structures for the Project. Steel pole tangent structures are proposed to be directly embedded into the ground if soil conditions warrant. Rock-filled culvert foundations may be required in areas with poor soils. This method typically involves digging a hole for each pole, filling it partially with crushed rock and then setting the pole on top of the rock base. The area around the pole is then backfilled with crushed rock and/or soil. Culvert foundations involve auguring a hole for each pole, installing a galvanized steel culvert, filling the annular space outside the culvert with hole spoils, filling the culvert partially with crushed rock and then setting the pole on top of the rock base. The annular space between the pole and culvert is filled with crushed rock.

Long span, angle and dead end structures along the route will require concrete foundations. In those cases, holes will need to be drilled in preparation for the concrete foundations. Drilled pier foundations may vary from five to eight feet in diameter and 20 to 30 feet deep, depending on soil conditions. Steel reinforcing bars and anchor bolts are installed in the drilled holes prior to concrete placement. Concrete trucks are required to bring the concrete in from a local concrete batch plant. Steel pole structures are hauled unassembled on pole trailers to the staked location and placed within the right-of-way until the pole sections are assembled and the arms attached. Insulators and other hardware are attached while the steel pole is on the ground. The pole is then lifted, placed, and secured on the foundation using a crane.

Construction staging areas are usually established for transmission projects. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. Construction of the Project will likely include one or two staging areas. Structures

are delivered to staging areas and materials are stored until they are needed for the Project. The materials are then sorted and loaded onto structure trailers for delivery to the staked location.

In some cases, additional space (temporary lay down areas) may be required. These areas will be selected for their location, access, security and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. The temporary lay down areas outside of the transmission line right-of-way will be secured from affected landowners through rental agreements.

Typically, access to the transmission line right-of-way corridor is made directly from existing roads or trails that run parallel or perpendicular to the transmission line right-of-way. In some situations, private field roads or trails are used. Where easements exist, the Company notifies the property owner that it will access the easement area. Where necessary to accommodate the heavy equipment used in construction, including cranes, concrete trucks and foundation drilling equipment, existing access roads may be upgraded or new roads may be constructed. New access roads may also be constructed where no current access is available or the existing access is inadequate to cross roadway ditches.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas will be to span wetlands, streams, and rivers. In addition, the Company will not allow construction equipment to be driven across waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from waterways.

Wetlands present within the Project Area are dominated by Palustrine or grassland/meadow type wetlands with a lesser number of Lacustrine or open water wetlands. Impacts to wetlands will be minimized through construction practices. Construction crews will maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and to minimize soil erosion. Practices may include: containing excavated material, protecting exposed soil and stabilizing restored soil. Crews will avoid major disturbance of individual wetlands and drainage systems during construction. This will be accomplished by strategically locating new access roads and spanning wetlands and drainage systems where possible.

When it is not feasible to span the wetland, construction crews will consider the following options during construction to minimize impacts:

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

5.1.6 Restoration Procedures

During construction, crews will attempt to limit ground disturbance wherever possible. However, areas are typically disturbed during the normal course of work, which can take several weeks in any one location. As construction on each parcel is completed, disturbed areas will be restored to their original condition to the maximum extent practicable. The right-of-way agent contacts each property owner after construction is completed to determine whether any damage has occurred as a result of the project.

If damage has occurred to crops, fences or the property, the Company will fairly reimburse the landowner for the damages sustained. In some cases, the Company may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Portions of vegetation that are disturbed or removed during construction of transmission lines will naturally reestablish to pre-disturbance conditions. Resilient species of common grasses and shrubs typically reestablish with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line corridor will require assistance in reestablishing vegetation and controlling soil erosion.

Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences;
- Hay bales;
- Hydro seeding; and
- Planting individual seeds or seedlings of native species.

These erosion control and vegetation establishment practices are regularly used in construction projects and are referenced in the construction storm water permit plans. Long-term impacts are also minimized by utilizing these construction techniques.

5.1.7 Maintenance Procedures

Transmission lines and substations are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation.

The estimated service life of the proposed transmission line for accounting purposes is approximately 50 years. However, practically speaking, high voltage transmission lines are seldom completely retired. Transmission infrastructure has very few mechanical elements and is built to withstand weather extremes that are normally encountered. With the exception of severe weather such as tornadoes and heavy ice storms, transmission lines rarely fail.

Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is very high, in excess of 99 percent.

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

Substations require a certain amount of maintenance to keep them functioning in accordance with accepted operating parameters and the NESC requirements. Transformers, circuit breakers, batteries, protective relays, and other equipment need to be serviced periodically in accordance with the manufacturer's recommendations. The substation site must be kept free of vegetation and adequate drainage must be maintained.

5.2 ELECTRIC AND MAGNETIC FIELDS

The term electromagnetic fields ("EMF") refer to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For the lower frequencies associated with power lines (referred to as "extremely low frequencies" ("ELF")), EMF

should be separated into electric fields ("EFs") and magnetic fields ("MFs"), measured in kilovolts per meter ("kV/m") and milliGauss ("mG"), respectively. These fields are dependent on the voltage of a transmission line (EFs) and current carried by a transmission line (MFs). The intensity of the electric field is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

See Section 6.2.1 for additional information on this subject relating to public health and safety.

5.2.1 Electric Fields

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 1.48 kV/m (115 kV single circuit), far below the 8 kV/m maximum imposed by the Commission. The calculated electric fields are provided in **Table 8**.

Table 8
Calculated Electric Fields (kV/M) for Proposed 115 KV Transmission Line Designs
(One Meter Above Ground)

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline										
		-300'	-200'	-100'	-50'	-25	0'	25	50'	100'	200'	300'
Segments 2-10: Horizontal Post 115kV Steel Pole Single Circuit*	121	0.01	0.01	0.04	0.15	0.39	1.13	0.51	0.15	0.05	0.01	0.01
Segments 2-10: H-Frame and Y-Frame 115kV Steel Pole Single Circuit	121	0.00	0.01	0.09	0.52	1.48	0.68	1.48	0.52	0.09	0.01	0.00
Segments 2-10: 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: 115/115 kV Steel or Wood Pole Double Circuit	121	0.012	0.024	0.043	0.151	0.689	1.139	0.689	0.151	0.043	0.024	0.012

*The EMF levels for the cantilever design options being considered on this Project are not significantly different from the horizontal post or braced post design.

5.2.2 Magnetic Fields

There are presently no Minnesota regulations pertaining to MF exposure. Xcel Energy provides information to the public, interested customers and employees so they can make informed decisions about MFs. Such information includes the availability for measurements to be conducted for customers and employees upon request.

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 peak and average current flows as projected 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) for Proposed 115 kV Transmission Line Designs (One Meter Above Ground)

Segment	System Condition	Current (Amps)	Distance to Proposed Centerline										
			-300'	-200'	-100'	-50'	-25	0'	25	50'	100'	200'	300'
Westgate to Deephaven 115 kV Single Circuit	Peak	296	0.44	0.83	2.60	7.68	17.19	32.82	18.21	7.39	2.10	0.55	0.27
	Average	178	0.27	0.50	1.56	4.62	10.34	19.73	10.95	4.45	1.26	0.33	0.16
Deephaven to Excelsior 115 kV Single Circuit	Peak	71	0.11	0.20	0.62	1.84	4.12	7.87	4.37	1.77	0.50	0.13	0.07
	Average	43	0.06	0.12	0.38	1.12	2.50	4.77	2.64	1.07	0.31	0.08	0.04
Excelsior to Scott County 115kV Single Circuit	Peak	31	0.05	0.09	0.27	0.43	1.80	3.44	1.91	0.77	0.22	0.06	0.03
	Average	19	0.03	0.05	0.17	0.49	1.10	2.11	1.17	0.47	0.13	0.04	0.02
Excelsior to Scott County 115/115 kV Double Circuit	Peak	31	0.13	0.24	0.71	1.83	3.08	3.87	3.00	1.81	0.72	0.24	0.13
	Average	19	0.08	0.14	0.44	1.12	1.89	2.37	1.84	1.11	0.44	0.15	0.08
Braced Post 115kV Steel Pole Single Circuit With 13.8kV Distribution Underbuild	Peak	296/25	0.27	0.56	2.03	5.64	9.67	12.48	10.18	6.12	2.46	0.82	0.43
	Average	178/15	0.16	0.34	1.22	3.39	5.81	7.51	6.12	3.68	1.48	0.49	0.26

* The MF levels for the cantilever design options being considered on this Project are not significantly different from the braced post or horizontal post design.

5.2.3 Stray Voltage

Stray voltage (also known as Neutral to Earth Voltage ("NEV") is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission 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. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures will be taken to prevent stray voltage problems when the transmission lines proposed in the Application are parallel to or cross distribution lines.

See Section 6.2.1 for additional information on this subject relating to public health and safety.

5.2.4 Farming, Vehicle Use and Metal Buildings Near Power Lines

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge will drain off when the charger unit is connected to the fence. When the charger is disconnected either for maintenance or when the fence is being built, shocks may result. Potential shocks can be prevented by using a couple of methods, including:

i. one or more of the fence insulators can be shorted out to ground with a wire when the charger is disconnected; or

ii. an electric filter can be installed that grounds out charges induced from a power line while still allowing the charger to be effective.

Farm equipment, passenger vehicles and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements with respect to roads, driveways, cultivated fields and grazing lands specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

There is a potential for vehicles under high voltage transmission lines to build up an electric charge. If this occurs, the vehicle can be grounded by attaching a grounding strap to the vehicle long enough to touch the earth. Such buildup is a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to

ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, vehicles will not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from the ground.

Buildings are permitted near transmission lines but are generally discouraged within the right-of-way itself because a structure under a line may interfere with safe operation of the transmission facilities. For example, a fire in a building on the right-of-way could damage a transmission line. As a result, NESC guidelines establish clear zones for transmission facilities. Metal buildings may have unique issues. For example, metal buildings near power lines of 200 kV or greater must be properly grounded. Any person with questions about a new or existing metal structure can contact Xcel Energy for further information about proper grounding requirements.

6.0 ENVIRONMENTAL INFORMATION

This section provides a description of the environmental setting, potential impacts and mitigative measures Xcel Energy has proposed, where appropriate, to minimize the impacts of siting, constructing and operating the Project. If the proposed transmission lines were removed in the future, the land could be restored to its prior condition and/or put to a different use. The majority of the measures proposed are part of the standard construction process at Xcel Energy. Unless otherwise identified in the following text, the costs of the mitigative measures proposed are considered nominal.

6.1 DESCRIPTION OF ENVIRONMENTAL SETTING

The proposed transmission line rebuild is located in Carver, Hennepin, and Scott Counties. Cities affected by the rebuild will include Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie. The Project Area begins at the Scott County Substation located in Jackson Township and proceeds north crossing the Minnesota River in the City of Chaska. The Project Area continues northward to the Bluff Creek Substation and to Structure #57 located on Xcel Energy 115 kV Transmission Line #5516 and follows the existing transmission right-of-way (Line #0734) terminating at the Westgate Substation (located in Eden Prairie, MN). The proposed transmission line rebuild located almost entirely within residential or commercial areas.

The approximate 485 acre Project Area (**Appendix B.1: General Vicinity Map - Segments 1-10**) is located within the Big Woods subsection of the Minnesota and Northeast Iowa Morainal Section (222M), a section within the biogeographic province known as the Eastern Broadleaf Forest Province under the Ecological Classification System ("ECS") developed by the Minnesota Department of National Resources ("MnDNR") and the United States Forest Service ("USFS") (MNDNR, 2010). The dominant landscape features in the general area are described as level topped hills bounded by smooth side slopes per the ECS. There are broad level areas between these hills that contain lakes and peat bogs, with the area's drainage controlled by the level of these lakes. The topography of this ECS subsection is gently to moderately rolling. The topography of the Project Area, however, is relatively level and ranges from 1,025 feet above mean sea level in elevation in the west to 915 feet above mean sea level as the transmission line route travels to the east. The lowest portion of the Project Area is within Segment 1 where it ranges from 700 to 850 mean sea level as it crosses the Minnesota River.

Geologic and topographic information from the MnDNR and the United States Geological Survey ("USGS") was analyzed to determine the existing conditions within the Project Area and the potential effects on those conditions.

Pre-settlement vegetation consisted primarily of oak woodland and maple basswood forest with pockets of prairie. With the exception of areas around the Minnesota River, the majority of the Project Area has been nearly entirely developed for residential and commercial occupancy with only small portions of either upland forest or wetlands. Other portions cross or pass by water features (Bluff Creek and Assumption Creek in Carver County and Purgatory Creek in Hennepin County, Strunk Lake, Harrison Lake, College Lake, Mud Lake, Galpin Lake, Lake Minnetonka, William Lake, Duck Lake, as well as numerous unnamed lakes and drainages).

6.2 HUMAN SETTLEMENT

6.2.1 Public Health and Safety

The Project will be designed in compliance with local, state, NESC, and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and right-of-way widths. Xcel Energy construction crews and/or contract crews will comply with local, state, NESC, and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Company and industry safety procedures will be followed during and after installation of the transmission lines. This will include clear signage during all construction activities.

The proposed transmission lines will be equipped with protective devices to safeguard the public from the transmission lines if an accident occurs, such as a structure or conductor falling to the ground. The protective devices include breakers and relays located where the line connects to the substation(s). The protective equipment will de-energize the line should such an event occur. Proper signage will be posted warning the public of the risk of coming into contact with the energized equipment.

Electric and Magnetic Fields

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 hertz) magnetic fields causes biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between MF exposure and health risks. Public health professionals have also investigated the possible impact of exposure to MF upon human health for the past several decades. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

In 1999, the National Institute of Environmental Health Sciences ("NIEHS") issued its final report on "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" in response to the Energy Policy Act of 1992 (Olden, 1992). The NIEHS concluded that the scientific evidence linking MF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern. However, because of the weak scientific evidence that supports some association between MF and health effects and the common exposure to electricity in the United States, passive regulatory action, such as providing public education on reducing exposures, is warranted.

In 2007, the World Health Organization ("WHO") concluded a review of the health implications of electromagnetic fields. In this report, the WHO stated:

> Uncertainties in the hazard assessment [of epidemiological studies] include the role that control selection bias and exposure misclassification might have on the observed relationship between magnetic fields and childhood leukemia. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but sufficiently strong to remain a concern. (*Environmental Health Criteria Volume N°238 on Extremely Low Frequency Fields* at p. 12, WHO (2007)).

Also, regarding disease outcomes, aside from childhood leukemia, the WHO stated that:

> A number of other diseases have been investigated for possible association with ELF magnetic field exposure. These include cancers in children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications and neurological disease. The scientific evidence supporting a linkage between ELF magnetic fields and any of these diseases is much weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease. (*Id.* at p. 12.)

Furthermore, in their "Summary and Recommendations for Further Study" WHO emphasized that:

> The limit values in [ELF-MF] exposure guidelines [should not] be reduced to some arbitrary level in the name of precaution. Such practice undermines the

> scientific foundation on which the limits are based and is likely to be an expensive and not necessarily effective way of providing protection. (*Id.* at p. 12).

Although WHO recognized epidemiological studies indicate an association on the range of three to four mG, WHO did not recommend these levels as an exposure limit but instead provided: "The best source of guidance for both exposure levels and the principles of scientific review are international guidelines." *Id.* at pp. 12-13. The international guidelines referred to by WHO are the International Commission on Non-Ionizing Radiation Protection ("ICNIRP") and the Institute of Electrical and Electronic Engineers ("IEEE") exposure limit guidelines to protect against acute effects. *Id.* at p. 12. The ICNIRP-1998 continuous general public exposure guideline is 833 mG and the IEEE continuous general public exposure guideline in 9,040 mG. In addition, WHO determined that "the evidence for a casual relationship [between ELF-MF and childhood leukemia] is limited, therefore exposure limits based on epidemiological evidence is not recommended, but some precautionary measures are warranted." *Id.* at 355-56.

WHO concluded that:

> given both the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, and the limited impact on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measures should be very low. . . Provided that the health, social and economic benefits of electric power are not compromised, implementing very low-cost precautionary procedures to reduce exposure is reasonable and warranted. (*Id.* at p. 13).

In 2010, ICNIRP revised its continuous general public exposure guideline increasing it from 833 mG to 2,000 mG. The WHO has not provided any analysis of the ICNIRP-2010 continuous general public exposure guideline to date.

Wisconsin, Minnesota and California have all conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group ("Working Group") to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL (High Voltage Transmission Lines) EMF effects. The Working Group consisted of staff from various state agencies and published its findings in a White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options in September 2002, (Minnesota State Interagency Working Group , 2002). The report summarized the findings of the Working Group as follows:

> Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe. (*Id.* at p. 1.)

The Public Service Commission of Wisconsin ("PSCW") has periodically reviewed the science on MFs since 1989 and has held hearings to consider the topic of MF and human health effects. The most recent hearings on MF were held in July 1998. Recently, January 2008, the PSC published a fact sheet regarding MFs. In this fact sheet the PSC noted that:

> Many scientists believe the potential for health risks for exposure to EMF is very small. This is supported, in part, by weak epidemiological evidence and the lack of a plausible biological mechanism that explains how exposure to EMF could cause disease. The magnetic fields produced by electricity are weak and do not have enough energy to break chemical bonds or to cause mutations in DNA. Without a mechanism, scientists have no idea what kind of exposure, if any, might be harmful. In addition, whole animal studies investigating long-term exposure to power frequency EMF have shown no connection between exposure and cancer of any kind. (*EMF-Electric & Magnetic Fields*, PSC (January 2008)).

The Minnesota Public Utilities Commission, based on the Working Group and World Health Organization findings, has repeatedly found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects." *In the Matter of the Application of Xcel Energy for a Route Permit for the Lake Yankton to Marshall Transmission Line Project in Lyon County*, Docket No. E-002/TL-07-1407, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Xcel Energy for the Lake Yankton to Marshall Transmission Project at p. 7-8 (Aug. 29, 2008); *See also*, *In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET-2, E015/TL-06-1624, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Minnesota Power and Great River Energy for the Tower Transmission Line Project and

Associated Facilities at p. 23 (Aug. 1, 2007)("Currently, there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects.").

The Commission again confirmed its conclusion regarding health effects and MFs in the Brookings County – Hampton 345 kV Route Permit proceeding ("Brookings Project"). In the Brookings Project Route Permit proceeding, Applicants Great River Energy and Xcel Energy and one of the intervening parties provided expert evidence on the potential impacts of electric and magnetic fields on human health. The ALJ in that proceeding evaluated written submissions and a day-and-half of testimony from these two expert witnesses. The ALJ concluded: "there is no demonstrated impact on human health and safety that is not adequately addressed by the existing State standards for [EF or MF] exposure." *In the Matter of the Route Permit Application by Great River Energy and Xcel Energy for a 345 kV Transmission Line from Brookings County, South Dakota to Hampton, Minnesota*, Docket No. ET-2/TL-08-1474, ALJ Findings of Fact, Conclusions and Recommendation at Finding 216 (April 22, 2010 and amended April 30, 2010). The Commission adopted this finding on July 15, 2010. *In the Matter of the Route Permit Application by Great River Energy and Xcel Energy 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 (September 14, 2010).

Stray Voltage

There is a potential for vehicles under high voltage transmission lines to build up an electric charge. If this occurs, the vehicle can be grounded by attaching a grounding strap to the vehicle long enough to touch the earth. Such buildup is a rare event because generally vehicles are effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, vehicles will not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic, or other surfaces that insulate them from ground.

Buildings are permitted near transmission lines but are generally prohibited within the right-of-way itself because a structure under a line may interfere with safe operation of the transmission facilities. For example, a fire in a building on the right-of-way could damage a transmission line. As a result, NESC guidelines establish clear zones for transmission facilities. Metal buildings may have unique issues. For example, metal buildings near power lines of 200 kV or greater must be properly grounded. Any person with questions about a new or existing metal structure can contact the Company for further information about grounding requirements.

Mitigative Measures

There are no mitigative measures necessary to address human health and safety.

6.2.2 Commercial, Industrial, Residential Land Use

Land use in the Project Area is primarily a mix of both residential and commercial land use. The Project Area passes through seven individual municipalities located in two Minnesota counties. The City of Eden Prairie is the largest municipality located along the route with a population of over 60,000 (2010 Census). The closest commercial structure to the Project is located approximately 11 feet from the line near the intersection of Excelsior Boulevard, Minnetonka Boulevard, and Hidden Lane in Excelsior in the City of Excelsior, Minnesota (*see* **Appendix B.2: Environmental Features Map – Segments 4 and 5** *and* **Appendix B.3: Detailed Environmental Features Map-Pages 14 and 15**). The closest residence is located approximately 3 feet from the existing 115/69 kV line that will be converted to 115/115 kV operation. No physical modification of this section of line is required to complete this conversion. The residence is located near the intersection of Desiree Street and Ehlers Avenue in the Riverview Terrace Mobile Home Park in Chaska, Minnesota. (*see* **Appendix B.2: Environmental Features Map – Segment 1** *and* **Appendix B.3: Detailed Environmental Features Map-Page 3**). The closest residence along the 115 kV rebuild section of the Project is located approximately 12.6 feet from the proposed centerline of the 115 kV line at intersection of Duck Lake Road and Duck Lake Trail East in Eden Prairie.

Classifications of entities noted in the previous sections were determined by digitizing current aerial photographs and then categorizing structures into "residential" and "commercial" by using a combination of Google Street Maps and aerial photo interpretation. The numbers of occupied structures located within various distances from the Project are shown in **Table 10** below.

Mitigative Measures

The Project will be designed in compliance with local, state, NESC, and the Company standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and right-of-way widths. The proposed transmission lines will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs, such as a structure or conductor falling to the ground. As discussed above, in segments where the existing 69 kV structures will be replaced with a new 115 kV structures, a cantilever design could be used to increase the distance from the conductors to nearby residences or buildings.

Table 10
Distance to Occupied Structures

Number of Residences within 0-25' of Proposed Line	Number of Commercial Operations within 0-25' of Proposed Line	Number of Residences within 26-50' of Proposed Line	Number of Commercial Operations within 26-50' of Proposed Line	Number of Residences within 51-100' of Proposed Line	Number of Commercial Operations within 51-100' of Proposed Line	Number of Residences within 101-200' of Proposed Line	Number of Commercial Operations within 101-200' of Proposed Line
12	**3**	**77**	**7**	**160**	**16**	**318**	**28**

6.2.3 Displacement

No displacement of residential homes or businesses will occur as a result of this Project. The NESC and Xcel Energy's standards require certain clearances between transmission line facilities and buildings for safe operation of the proposed transmission line. Xcel Energy acquire a right-of-way for the transmission line that is sufficient to maintain these clearances.

Mitigative Measures
Because no displacement will occur, no mitigative measures are proposed.

6.2.4 Noise

Transmission Line Noise

Transmission lines can generate a small amount of sound energy during corona activity where a small electrical discharge caused by the localized electric field near energized components and conductors ionizes the surrounding air molecules. Corona is the physical manifestation of energy loss and can transform discharge energy into very small amounts of sound, radio noise, heat, and chemical reactions of the air components. Several factors, including conductor voltage, shape and diameter, and surface irregularities such as scratches, nicks, dust, or water drops can affect a conductor's electrical surface gradient and its corona performance.

Noise emission from a transmission line occurs during certain weather conditions. In foggy, damp, or rainy weather, power lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the wires. During heavy rain the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain.

Since human hearing is not equally sensitive to all frequencies of sound, the most noticeable frequencies of sound are given more "weight" in most measurement schemes. The A-weighted scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA, which is the A-weighted sound level recorded in units of decibels.

A noise level change of 3 dBA is barely perceptible to human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise level is perceived as a doubling of noise loudness, while a 20 dBA change is considered a dramatic change in loudness. **Table 11** below shows noise levels associated with common, everyday sources.

In Minnesota, statistical sound levels (L Level Descriptors) are used to evaluate noise levels and identify noise impacts. The L_5 is defined as the noise level exceeded 5% of the time, or for three minutes in an hour. The L_{50} is the noise level exceeded 50% of the time, or for 30 minutes in an hour.

Table 11
Common Noise Sources and Levels

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Jointer/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: Minnesota Pollution Control Agency (2008).

Land areas, such as picnic areas, churches, or commercial spaces, are assigned to an activity category based on the type of activities or use occurring in the area. Activity categories are then categorized based on their sensitivity to traffic noise. The Noise Area Classification ("NAC") is listed in the MPCA noise regulations to distinguish the categories.

Table 12 identifies the MPCA established daytime and nighttime noise standards by NAC. The standards are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent of the time within the hour.

Table 12
Noise Standards by Noise Area Classification (dBA)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

There are approximately 621 residences and businesses are located within 400 feet of the Proposed Route. The closest commercial structure to the Project is located approximately 11 feet from the line near the intersection of Excelsior Boulevard, Minnetonka Boulevard, and Hidden Lane in Excelsior in the City of Excelsior, Minnesota. The closest residence is located approximately 3 feet from the existing 115/69 kV line that will be converted to 115/115 kV operation. The residence is located near the intersection of Desiree Street and Ehlers Avenue in a trailer park in Chaska, Minnesota.

Noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible. Noise levels should not be noticeably greater than existing levels.

The EPRI "Transmission Line Reference Book, 345 kV 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 rebuild of a 69 kV transmission line to 115 kV and converting a 115/69 kV transmission line to 115/115 kV. 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 a 75-foot-wide right-of-way (37.5 feet from centerline) would be at 22.2 and 18.7 dBA, respectively, well below the MPCA nighttime L50 limit of 50 dBA for Noise Area Classification 1. These findings are shown in **Table 13**.

Table 13
Calculated Audible Noise (db) for Proposed 115 kV Transmission Line Designs (3.28 Feet Above Ground)

Structure Type	Noise L5 (37.5 Feet From Centerline) (Decibels A- weighted)	Noise L50 (37.5 feet From Centerline) (Decibels A- weighted)
Horizontal Post 115kV Steel Pole Single Circuit	22.2	18.7
Y-Frame or H-Frame 115kV Steel Pole Single Circuit	17.9	14.4
Braced Post 115kV Steel Pole Single Circuit With 13.8kV Distribution Underbuild	22.7	20.7
Davit Arm 115kV/115kV Steel Pole Double Circuit	20.1	16.6

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 home to the Deephaven Substation is located approximately 200 feet to the southeast. The nearest non-residential structure to the Deephaven Substation is the Deephaven Elementary School which located approximately 160 feet to the west. The new transformer specifications requested for this substation design will result in a quieter transformer than what exists today.

The nearest home to the Excelsior Substation is 70 feet to the southeast and the nearest business is 48 feet to the south. The new transformer specifications requested for this substation design will result in a quieter transformer than what exists today.

With respect to the Westgate Substation, the nearest home is 400 feet to the northwest and the nearest business is 100 feet to the east. The structural features closest to the Scott County Substation are a gravel pit 900 feet to the west and a mobile home park approximately 380 feet to the southeast (across Highway 169). No change in noise levels from either of these substations are expected from the Project.

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

Mitigative Measures
No mitigative measures are proposed since no impacts are anticipated.

6.2.5 Television and Radio Interference

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations previously providing good reception can be restored by appropriate modification of (or addition to) the receiving antenna system. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side.

FM radio receivers usually do not pick up interference from transmission lines 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); 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/or 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.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose and/or damaged hardware may also cause television interference. If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, Xcel Energy will inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary.

Mitigative Measures

No impacts are anticipated and therefore no mitigative measures are proposed. If radio or television interference occurs due to the Project, Xcel Energy will work with the affected landowner to restore reception to pre-Project quality.

6.2.6 Aesthetics

Because the proposed Project will 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 kV single circuit line will be similar to the other 115 kV transmission lines used on the Xcel Energy system. 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 90 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 either galvanized steel or self-weathering steel. The existing transmission line structures in this area are a mix of wood poles, steel poles and some H-frame construction. The galvanized steel poles will give the transmission line a somewhat cleaner and more modern appearance, while the self-weathering steel poles will have a greater propensity to blend in with the local environment.

Like the existing 69 kV transmission line, the new single circuit transmission line will be visible to area residents. The majority of the landscape in the Project Area is developed residential and commercial. 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. However, the transmission lines that already exist in the Project Area will limit the extent to which the rebuild line in the existing transmission corridor will result in a disruption to the area's scenic integrity.

Mitigative Measures

Although the proposed line will alter views of surrounding land uses, Xcel Energy has identified the route that predominantly uses existing corridors and places new structures near the location of the existing structures to the greatest extent practicable. Xcel Energy will work with landowners to identify concerns related to the transmission line aesthetics.

6.2.7 Socioeconomic

Population and economic characteristics based on the 2010 U.S. Census are presented in **Table 14.**

Table 14
Population and Economic Characteristics

Location	Population	Minority Population (Percent)	Caucasian Population (Percent)	Per Capita Income	Percentage of Individuals Below Poverty Level
State of Minnesota	5,303,925	16.9	83.1	$29,431	10.9
Carver County	91,042	9.3	90.7	$35,987	5.0
City of Chanhassen	22,952	8.2	91.3	$43,571	2.9
City of Chaska	23,770	16.6	83.4	$33,358	8.4
Hennepin County	1,1,152,425	28.3	71.7	$35,687	11.9
City of Eden Prairie	60,797	20.0	80.0	$48,916	5.0
City of Shorewood	7,307	5.4	94.6	$58,789	1.1
City of Excelsior	2,393	5.9	94.1	$29,127	5.7
City of Greenwood	729	3.4	96.6	$63,200	0.8
City of Deephaven	3,853	2.6	97.4	$58,544	2.6
City of Minnetonka	49,734	11.4	88.6	$47,036	4.2
Scott County	129,928	15.5	84.5	$33,750	4.8

Source: 2010 U.S. Census: General Demographic Characteristics

According to the 2010 Census data, Carver County is 90.7 percent Caucasian, while Hennepin County is 71.7 percent Caucasian, and Scott County is 84.5 percent Caucasian.

The minority population percentage averages 4.8% in municipalities encompassing the Project Area.

In Carver County, the area proximal to the Project Area has an average household per capita income which is higher than the average for the county as a whole. This trend is similar in Hennepin County. Within the Project Area, the average percentages of minority populations and low-income populations are lower than both the county and state averages.

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.

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.

Mitigative Measures

No mitigative measures are proposed since no impacts are anticipated.

6.2.8 Cultural Values

Cultural values include those perceived community beliefs or attitudes in a given area, which provide a framework for community unity. The Project Area passes through eight individual municipalities distributed among three counties. According to the U.S. Census Bureau, the populations of the three counties derive from a diverse ethnic heritage. However, a majority of the reported ethnic backgrounds are of European origin. In Carver County, German and Scandinavian heritage comprises 76% of the total population, with German heritage being

the most prevalent with nearly 50%. Hennepin County has a similar, yet less pronounced German and Scandinavian ethnic representation at 55%, with German heritage being nearly 30%. Cultural representation in community events appears to be more closely tied to geographic features (such as Lake Minnetonka), seasonal events, national holidays, and municipal events than to those based in ethnic heritage. Examples of regional cultural events include the annual Fourth of July Celebrations in Chanhassen, Eden Prairie, and Excelsior; the Chan Jam Music Festival and Summer Concert Series in Chanhassen; the Art on the Lake and By the Bay Music Festival in Excelsior; the Arctic Fever event in Excelsior; and the Tour de Tonka regional bike race. Construction of the proposed Project is not expected to conflict with the cultural values along the route. No impacts to cultural values are anticipated.

Mitigative Measures

No impacts are anticipated and therefore no mitigative measures are proposed.

6.2.9 Recreation

The Project Area crosses eight municipalities. Moving west to east along the Project Area those municipalities include Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie. A total of fourteen parks intersect or abut the 200-foot-wide Project Area (**Table 15**). The municipality and uses of the fourteen identified parks are summarized in **Table 15**. The Project is not expected to directly impact any of these recreational resources.

Table 15
Parks, Recreation Areas, and Preserves Within the 200-Foot-Wide Project Area

Park	Municipality	Park Amenities																		
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap	Garden	Boat Access	Skate Park	Volleyball Court
Bluff Creek	Chaska				X	X	X	X												
Lake Minnewashta Regional Park	Chanhassen		X		X		X	X	X			X	X	X	X	X		X		X
Pinehurst Preserve at Lake Harrison	Chanhassen													X						
Bluff Creek Preserve	Chanhassen							X						X						
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X								
Burton Park	Deephaven							X				X	X	X						
Lake Minnetonka L Regional Trail	Multiple							X	X											
Purgatory Park	Minnetonka		X				X	X	X			X		X	X	X				
Kelly Park	Minnetonka							X	X			X					X			
Edenbrook Conservation Area	Eden Prairie		X				X	X				X		X						
Round Lake Park	Eden Prairie	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Edenvale Conservation Area	Eden Prairie							X				X		X						
Edenvale Park	Eden Prairie	X	X		X	X	X	X		X	X	X				X				
Minnesota Valley State Recreational Area	Carver and Scott Counties		X				X	X	X			X	X	X	X			X		

All parks, recreational areas, and preserves that lay within one mile of the project area were also identified. A total of 74 parks, recreation areas, and preserves (identified by municipality) are located within one mile of the Project Area and are summarized in **Table 16.**

Table 16
Parks, Recreational Areas, and Preserves Within One Mile of Project Area

Municipality	Area Name
Chaska	Riverview Park, Bluff Park, Shadow Wood Park, Schalow Park, Wood Ridge Park, and Pioneer Park
Chanhassen	Bluff Creek Preserve, Power Hill Park, Prairie Knoll Park, Lake Susan Park, Lake Susan Preserve Sunset Ridge Park, Bluff Creek Preserve North, Stone Creek Park, Chanhassen Nature Preserve, Bluff Creek Elementary School Park, Minnesota Landscape Arboretum, Bluff Creek Headwaters Preserve, Lake Ann Park, Sugarbush Park, Greenwood Shores Park, Lake Minnewashta Regional Park, Herman Field Park, Pinehurst Preserve at Lake Harrison, Pleasant Hill Park, Curry Farms Park.
Shorewood	Lake Minnetonka LRT Regional Trail, Badger Park, Manor Park, Shuman Woods Park.
Excelsior	Excelsior Commons, Lake Minnetonka LRT Regional Trail
Greenwood	Meadville Park, Lake Minnetonka LRT Regional Trail
Deephaven	Village Hill Park, Cottagewood Children's Park, Shuck Park, Nocomo Beach, Deephaven Beach Park, Lake Minnetonka LRT Regional Trail, Burton Park, Cleveland Park, unnamed park.
Minnetonka	Reich Park, Lake Charlotte, Woodgate Park, Holiday Lake Park, Kelly Gardens Park, Purgatory Park, Spring Hill Park, Covington Park, Boulder Creek Park, Gro Tonka Park, Elmwood-Strand Park, Mini Tonka Park
Eden Prairie	Birch Island Park, Timbercreek Conservation Area, Edenbrook Conservation Area, Rustic Hills Park, Wyndham Knoll Park, Eden Valley Park, Edgewood Park, High Estates Trail Park, Prairie View School Park, Hidden Ponds Park, Sterling Field Park, Round Lake Park, Mitchell Marsh Conservation Area, Edenvale Conservation Area, Edenvale Park, Westgate Conservation Area, Willow Park, Pheasant Woods Park, Red Rock Conservation Area, Minnesota River Bluffs LRT Regional Trail, Miller Park
Carver and Scott Counties	Minnesota Valley Recreational Area

A total of 28 bikeways intersect the Project Area along its length. The Minnesota Valley State Recreation Area Trail intersects the Project Area in the Scott County portion of Segment 1. The Lake Minnetonka LRT Regional Trail intersects the Project Area in Excelsior near Galpin Lake and generally parallels the Project Area for approximately five miles until the Project Area turns south along Highway 101. Within the City of Chanhassen bikeways intersect the Project Area at eleven locations, three of which parallel the Project Area for 0.10 to 1.0 mile long segments. Within the City of Excelsior one intersect occurs where the LRT Trail intersects then runs parallel to the Project Area for approximately one-half mile before entering the municipality of Greenwood. Within the City of Greenwood the LRT Trail runs parallel to the Project Area for approximately 1 ½ miles before entering the municipality of Shorewood. No other bikeway intersects occur within the City of Greenwood. The LRT Trail parallels the Project Area through the municipality of Shorewood for approximately one-half mile before entering the municipality of Deephaven. No other bikeways intersect the Project Area within the City of Shorewood. Within Deephaven, the LRT Trail parallels the Project Area for 1 ½ miles before entering the City of Minnetonka. A second bikeway intersects the Project Area within the municipality of Deephaven near the Deephaven substation. Within the City of Minnetonka, the LRT Trail parallels the Project Area for approximately ½ mile until the Project Area turns south along Highway 101. Bikeways intersect the Project Area at seven other locations within the municipality of Minnetonka. Within the City of Eden Prairie, bikeways intersect the Project Area at four locations.

Mitigative Measures

The Project will be visible from the Minnesota River, Strunk Lake, Harrison Lake, Galpin Lake, Lake Minnetonka, Duck Lake, and Round Lake; however direct impact to these resources is not expected. If impacts to these resources are encountered during construction of the Project, Xcel Energy will work with the appropriate representatives to minimize any impacts.

6.2.10 Public Services and Transportation

The eight municipalities provide water, sewer and electrical service to its residents. Based on comments provided by City staff, no public utility or road improvement projects are currently planned for the area near the existing Xcel Energy transmission line within the municipalities. Regional transportation studies have been undertaken by Carver and Hennepin Counties and MnDOT. The Carver County regional study 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 Project Area. The Hennepin County Transportation System Plan

has identified proposed improvements nearest the Project Area discuss upgrades to the intersection of Minnesota Highway #7 and #19.

Impacts to state planning were evaluated through solicitation of formal comment from MnDOT; see Section 7.1.3. In a letter dated June 10, 2010, William Goff indicated the need for a preliminary schedule for construction and the need for a Long Form Permit for any use of or work within the MnDOT right-of-way. No other comments specific to the Project were issued.

Mitigative Measures
Minimal to no impacts to public services are anticipated to occur as a result of the proposed project.

6.3 LAND-BASED ECONOMIES

6.3.1 Agriculture

Carver County has a strong economic dependence on agricultural production. According to the 2007 United States Department of Agriculture ("USDA") Census of Agriculture, Carver County has 800 individual farms, marking a 2% decrease in total number of farms over the previous five years. Agricultural lands cover 169,367 acres, representing over 70% of all lands in Carver County with an average farm size of 212 acres. Carver County ranks among the top 20 counties in production of 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.

Hennepin County has limited economic dependence on agricultural production. According to the 2007 USDA Census of Agriculture, Hennepin County has 582 individual farms, marking a 7% decrease in total number of farms over the previous five years. Agricultural lands cover 66,558 acres, representing over 18% of all land in Hennepin County with an average farm size of 114 acres. Hennepin County ranks among the top twenty Minnesota counties in the production of nursery, greenhouse, floriculture and sod products (ranking 3rd statewide); and horses, ponies, mules, burros, and donkeys (ranking 3rd statewide). Over $51 million was generated from both crop and livestock sales in 2007.

Scott County has moderate economic dependence on agricultural production. According to the 2007 USDA Census of Agriculture, Scott County has 795 individual farms, marking a 21% decrease in total number of farms over the previous five years. Agricultural lands cover 117,551 acres, representing over 52% of all land in Scott County with an average farm size of

148 acres. Scott County ranks among the top twenty Minnesota counties in the production of fruits, tree nuts, and berries (ranking 5th statewide); Christmas trees and short rotation woody crops (ranking 6th statewide); pheasants (ranking 3rd statewide); and pigeons or squab (ranking 1st statewide). Over $63 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 24 acres. This acreage is comprised of numerous, small agricultural properties distributed throughout the Project Area. 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. Operation of these vehicles on adjoining farm fields can cause rutting and compaction, particularly during springtime and otherwise wet conditions.

Mitigative Measures

Landowners will be compensated for the use of their land through easement payments. 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.

6.3.2 Forestry

There are no forested areas where species are harvested along the proposed transmission line rebuild route. The primary tree cover in the area is associated with waterways and homesteads. No economically significant forestry resources are located along the proposed transmission line rebuild route.

Mitigative Measures

No impacts forestry resources are anticipated and therefore no mitigative measures are proposed.

6.3.3 Tourism

Primary tourism activities in the region include camping, recreational use of the regions lakes for fishing and boating, bicycling, and cross country skiing. Lake Minnetonka is the largest lake in the Project Area and the dominant recreational feature.

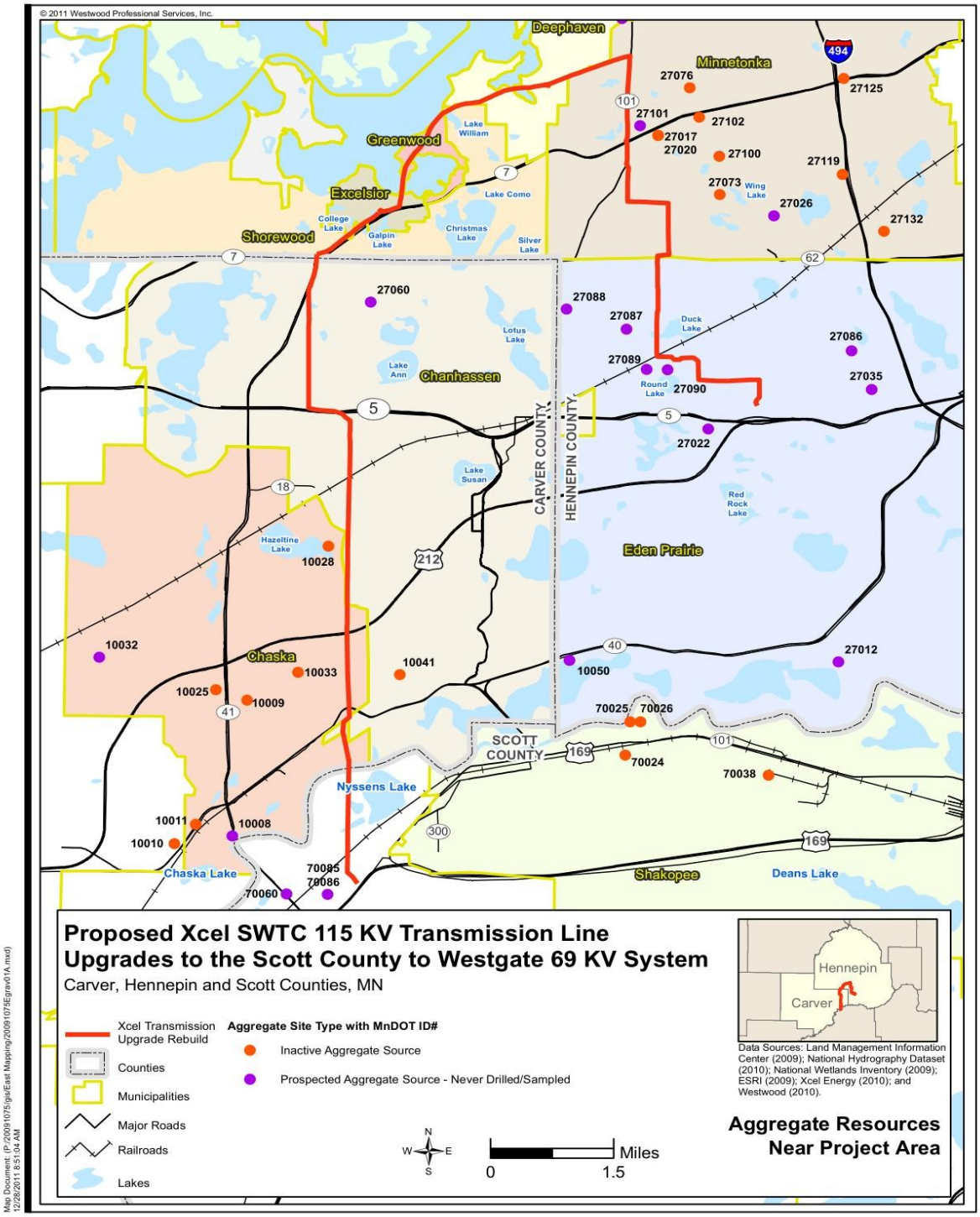
Mitigative Measures

No impacts to tourism are anticipated and therefore no mitigative measures are proposed.

6.3.4 Mining

There are multiple gravel pits, rock quarries and commercial aggregate sources in the vicinity of the Project Area (*see* **Figure 8**). According to the Minnesota Department of Transportation Aggregate Unit Office of Materials & Road Research (2002) there are no active gravel pits located within one mile of Segments 2 through 10 of the Project Area. A number of inactive pits and registered prospected sources exist, but these are located in currently commercial or residential districts. These sources are not located within the Project Area and will not be affected by the Project should development be pursued. Unknown resources that may exist in the Project Area would be situated in close proximity to existing utility and roadway ROW, making such a discovery unlikely. There are three active pits within 1 mile of Segment 1 of the Project. One is a bedrock quarry and the other two are aggregate pits. These three active pits are outside the Project Area.

Figure 8
Aggregate Resources in the Project Vicinity



Mitigative Measures

No impacts to mining operations are anticipated and therefore no mitigative measures are proposed.

6.4 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

A total of 679 previously recorded cultural resource properties (both archaeological and historic/architectural) were located within one mile of the proposed Project Area. A summary of the inventoried cultural resources is provided in **Appendix F**. In September 2010, a review of records at the Minnesota State Historic Preservation Office ("SHPO") and the Minnesota Office of the State Archaeologist ("OSA") identified 35 archaeological sites and 644 inventoried historic architectural properties are located within one mile of the Project Area.

Of the 35 archaeological sites, 16 consist of prehistoric artifacts scatters, six are single artifact finds, two are historical documentation records of abandoned townsites, seven are earthworks (which may or may not contain burials), two are cemeteries, one is a historic district containing ruins and artifacts, and one is a mill site. The historic district has a Considered Eligible Finding (CEF) by the SHPO. The eligibility of the remaining inventoried archaeological sites is unevaluated.

Of the 644 historic architectural resources identified in the records review, five are listed on the National Register of Historic Places (NRHP) and 21 have a CEF. The five NRHP properties are: 1) Heck, Albertine and Fred, House, located in the City of Chanhassen, Carver County; 2) the Excelsior School, located in the City of Excelsior, Hennepin County; 3) Wyer, Allemarinda and James, House, located in the City of Excelsior, Hennepin County; 4) Excelsior Fruit Growers Association Building, located in the City of Excelsior, Hennepin County; and 5) Peter Gideon Farmhouse, located in the City of Shorewood, Hennepin County.

Only 26 of the 679 cultural resource properties identified are located within the 200 foot Project Area. Nineteen of those properties are located within the boundaries of the City of Excelsior and distributed along project Segments 4 and 5. Five are located in the City of Minnetonka along portions of Project Segment 8. Two are located within the City of Eden Prairie; one each in Segment 9 and 10. Only one of the 26 properties located within the 200-foot-wide Project Area is considered eligible for listing on the National Register of Historic Places. This is the bridge on Minnetonka Boulevard that crosses the inlet of Lake Minnetonka (Bridge No. 90608). These properties will not experience direct impacts resulting from the construction of this Project. The existing transmission route in proximity to 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.

Mitigative Measures

The proposed Project will avoid impacts to identified archaeological and historic/ architectural resources to the extent possible. Should a specific resource impact be identified, Xcel Energy will consult with SHPO on whether the resource is eligible for listing in the NRHP. While avoidance would be a preferred action, mitigation for Project-related impacts on NRHP-eligible archaeological and historic resources may include resource investigations and/or additional documentation through data recovery.

6.5 NATURAL ENVIRONMENT

6.5.1 Air Quality

Potential air quality effects related to transmission facilities include fugitive dust emissions during construction, exhaust emissions from construction equipment and ozone generation during transmission line operation (Jackson et al., 1994). All of these potential effects are considered to be relatively minor, and all but the ozone effects are short-term.

Corona consists of the breakdown or ionization of air within a few centimeters of conductors. Usually some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Ozone also forms in the lower atmosphere from lightning discharges, and from reactions between solar ultraviolet radiation and air pollutants, such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight, and inversely proportional to humidity. Thus humidity or moisture, the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a very reactive form of oxygen molecules and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short lived.

State and federal governments currently regulate permissible concentrations of ozone (0_3) and nitrogen oxides (NO_X). Ozone forms in the atmosphere when nitrogen oxides and volatile organic compounds react in the presence of heat and sunlight. Air pollution from cars, trucks, power plants and solvents contribute to the concentration of ground-level ozone through these reactions. The national ozone standard is 0.075 parts-per-million (ppm) during an eight-hour averaging period. The state ozone standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year. Both averages must be compared to the national and state standards because of the different averaging periods.

Calculations done for a 345 kV project showed that the maximum one hour concentration during foul weather (worst case) would be 0.0007 ppm. This is well below both the federal and state standards. Lower voltage lines would have correspondingly lower concentrations. Most calculations of the production and concentration of ozone assume high humidity or rain, with no reduction in the amount of ozone due to oxidation or air movement. These calculations would therefore overestimate the amount of ozone that is produced and concentrated at ground level. 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.

Minor temporary effects on air quality are anticipated during construction of the proposed line rebuild as a result of exhaust emissions from construction equipment and other vehicles, and from fugitive dust that becomes airborne during dry periods of construction activity.

The magnitude of air emissions during construction is influenced by weather conditions and the type of construction activity. Exhaust emissions, primarily from diesel equipment, will vary with the phase of construction. Adverse effects on the surrounding environment are expected to be negligible because of the short and intermittent nature of the emission and dust-producing construction phases.

Mitigative Measures

Xcel Energy will employ Best Management Practices ("BMPs") to minimize the amount of fugitive dust created by the construction process. Tracking control at access roads and wetting surfaces are examples of BMPs that will be used to minimize fugitive dust. Based upon this, Xcel Energy anticipates nominal impacts to air quality. Therefore, no other mitigative measures are proposed.

6.5.2 Water Quality

Floodplains

The Project Area crosses the 100- and 500-year floodplains of the Minnesota River, Lower Lake Minnetonka, and two unnamed Public Water Wetlands (27-895W and 27-874W). In addition, the Project Area crosses the 100-year floodplain of Bluff Creek, Purgatory Creek, Carson's Bay of Lake Minnetonka, and Duck Lake (27-69P). **Table 17** summarizes floodplain crossings by segment according to FEMA Flood Insurance Rate Maps (FEMA, 1992).

Table 17
Floodplain Crossings Within the Project Area

Segment ID	500-yr		100-yr	
	Occurrence	Length (ft)	Occurrence	Length (ft)
Segment 1	1	127	3	7,386
Segment 2	0	0	3	1,665
Segment 3	0	0	1	451
Segment 4	1	428	1	375
Segment 5	4	1,178	2	2,239
Segment 6	0	0	1	941
Segment 7	0	0	0	0
Segment 8	1	1,900	2	2,741
Segment 9	0	0	2	1,573
Segment 10	0	0	1	1,945
Total	**7**	**3,633**	**16**	**19,316**

Refer to **Appendix B.2: Environmental Features Maps and Appendix B.3: Detailed Environmental Features Maps** for the location of the floodplain crossings. The crossings occur in predominately residential neighborhoods and correspond to existing roadways with the exception of two locations; one in Segment 3 and one in Segment 8. Overall, there are a total of 63.42 acres of 100 year floodplain within the Project Area corridor and 2.29acres of 500-year FEMA floodplain.

Wetlands, Waters, and Watercourses

Various large wetland complexes and small isolated wetlands are located throughout the Project Area, although a higher concentration of wetlands exists near the midsection of the proposed transmission route near the communities of Excelsior, Greenwood, and Deephaven. Many of these wetlands are adjacent to the various lakes that lie in close proximity to the Project Area. 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, 88 separate wetlands consisting of 18 different wetland types were identified within the 200-foot-wide Project Area. Overall, the 200 foot wide transmission line corridor of the existing line is approximately 20 miles long and encompasses approximately 485 acres, of which approximately 64.62 acres (13.3%) are wetlands (*see* **Appendix B.2** and **B.3**). Based

on average spacing figures, it is anticipated that approximately 455 transmission poles will be necessary to complete the proposed construction. It is estimated that 61 of these poles will fall within wetlands. Since no physical alteration will occur within Segment 1, no wetland impacts from Segment 1 are accounted for in these calculations.

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 and Riverine, which are associated with rivers.

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, thirteen of the Palustrine wetlands have an open water components 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 are at locations with existing infrastructure (roadways) and do not appear to be as deep as 6.6 feet, but they are included as part of the same basin. The Riverine System includes all wetlands and deepwater habitats contained within a channel. The Riverine System is bounded by the landward side by upland, by the channel bank (including natural and man-made levees), or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

The wetlands identified in the Project Area based on NWI mapping are listed in **Table 18** and shown in **Appendix B.2** and **B.3**.

Table 18
Wetlands Identified Within the Project Area

County	Cowardin Type	Count	Approx. Area (Acres)
WestwooCarver	PEMA	1	0.06
Carver	PEMAd	3	3.74
Carver	PEMC	8	4.53
Carver	PEMCd	6	8.85
Carver	PFO1C	4	4.49
Carver	PFO1/EMCd	1	0.41
Carver	PSS1C	3	0.60
Carver	PEM/SS1Bd	1	5.94
Carver	PUBF	1	0.06
Carver	PUBG	1	3.18
Carver	R2UBH	1	0.39
Hennepin	L1UBH	3	3.62
Hennepin	PEM/SS1C	3	2.69
Hennepin	PEM/SS1Cd	2	1.84
Hennepin	PEM/UBF	2	0.28
Hennepin	PEM/UBFh	1	0.24
Hennepin	PEMC	12	6.78
Hennepin	PEMCd	4	0.54
Hennepin	PEMF	9	6.04
Hennepin	PFO1C	1	0.33
Hennepin	PSS1C	1	0.13
Hennepin	PUBF	2	0.11
Hennepin	PUBG	4	2.67
Hennepin	PUBGx	2	0.16
Scott	PEMC	5	2.25
Scott	PEM/SS1Cd	1	1.49
Scott	PFO1C	2	0.04
Scott	R2UBH	1	0.71
Scott	PEMFd	1	1.04
Scott	PEMF	1	0.28
Scott	PUBG	1	1.13

The MnDNR Public Waters Inventory (PWI) identifies Public Wetlands, Waters and Watercourses. The Project Area intersects nine Public Wetlands (W), four Public Waters (P), and four Watercourses; Bluff Creek, Purgatory Creek, Assumption Creek, and Minnesota River. There are four intersects with Bluff Creek, three with Purgatory Creek, one with Assumption Creek, and one with Minnesota River at the beginning of Segment 1. The Public Wetlands and Waters are scattered across the length of the Project Area and include 70-116P (Strunks Lake), 27-133P (which has four intersects with the Project Area), 27-142P, 27-69P, 70-117W, 10-223W, 27-895W, 27-882W, 27-874W (three intersects with the Project Area), 27-890W, 27-820W, 27-985W, 27-987W, 27-988W, and 10-132W. The Minnesota River and Assumption Creek intersects are within Segment 1, Bluff Creek

intersects are within Segments 1, 2, and 3 and Purgatory Creek intersects are within Segments 8, 9, and 10 (*see* **Appendix B.2** and **B.3**).

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 (USACE), MnDNR, and several Local Government Units (LGU's). 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).

Mitigative Measures

Xcel Energy will minimize impacts to public waters and wetlands to the greatest extent possible. Xcel Energy will apply erosion control measures identified in the MPCA Storm Water Best Management Practices Manual, such as using silt fence, to minimize impacts to adjacent water resources. During construction, Xcel Energy will control operations to minimize and prevent material discharge to surface waters. If materials do enter streams, they will be promptly removed and properly disposed of to the extent feasible.

Disturbed surface soils will be stabilized at the completion of the construction process to minimize the potential for subsequent effects on surface water quality. Permanent impacts to public waters and wetlands will be avoided wherever feasible by maximizing the typical span length over these areas.

The transmission line rebuild may require waters and wetlands permits, letters of no jurisdiction, or exemptions from the USACE, MnDNR Division of Waters, and LGU's that administer WCA. 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.

The cities of Chanhassen, Greenwood, Deephaven, Eden Prairie, Minnetonka, Chaska, and Minnehaha Creek Watershed District (MCWD), and Jackson Township (Scott County) are all LGU's that administer the WCA in the Project Area. It is possible that the BWSR representatives for Carver, Scott, and Hennepin Counties will coordinate with the LGU'S so that one entity administers the WCA over the entire Project Area. As a utilities project, 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 Xcel Energy 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. In the event that a National Pollutant Discharge Elimination System ("NPDES") construction storm water permit and Stormwater Pollution Prevention Plan ("SWPPP") is required for the Project, Xcel Energy will obtain the permit and SWPPP. 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.

6.5.3 Flora

Land cover in the Project Area consists primarily of low to high intensity development including residential, light industrial, and roadways. **Table 19** below summarizes land cover within the 200-foot-wide Project Area (*see* **Appendix B.5: Land Use Map**).

Table 19
Landcover Within the Project Area

Cover Type	Area (acres)
Forest/Shrub land	73.62
Developed/High Intensity	28.18
Developed/Low Intensity	135.03
Developed/Medium Intensity	60.87
Developed/Open Space	95.71
Herbaceous & Woody Wetlands	11.82
Open Water	7.51
Pasture/Hay/Cropland	77.28

Source USDA, NASS Cropland Data Layer (2011)

The Project consists of improvements to existing infrastructure which is in place largely along existing roadways. Other significant land cover types within the Project Area are wetlands, deciduous forest, and developed open space with a small portion as cultivated cropland. Reed canary grass, cattail, cottonwood, sandbar willow, and sedges are the primary

species in wetlands. Common species in forested areas include sugar maple, American elm, box elder, green ash, bur and red oak, and eastern cottonwood. Transmission line construction impacts to trees and woodlands will be minimized because the transmission line rebuild will follow existing right-of-way. (*see* **Appendix B.2** and **B.3**). For a discussion on impacts to agriculture, please see **Section 6.3.1**.

Mitigative Measures

To minimize impacts to trees in the Project Area, Xcel Energy will limit tree clearing and removal to the transmission line right-of-way, areas that limit construction access to the Project Area, and areas that impact the safe operation of the facilities.

6.5.4 Fauna

The croplands, 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 gamebirds; and reptiles/amphibians such as frogs, salamanders, snakes, and turtles. Lists of mammals, birds, amphibians, and reptiles that are representative of the habitats of the area are included in **Appendix C**. These lists were compiled from knowledge of the area, (Hazard, 1982, Janssen, 1987, and Center for North American Herpetology, 2011).

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.

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. Xcel Energy 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.

Mitigative Measures

It is anticipated that most wildlife displacement and habitat impacts will be temporary. Consequently, no wildlife population mitigation measures are proposed. Xcel Energy has been working with various state and federal agencies for over 20 years to address avian issues as quickly and efficiently as possible. In 2002, Xcel Energy Operating Companies, including Xcel Energy, entered into a voluntary Memorandum of Understanding ("MOU") with the U.S. Fish and Wildlife Service ("USFWS") to work together to address avian issues throughout its service territories. The MOU sets forth standard reporting methods and the development of Avian Protection Plans ("APP") for each state that Xcel Energy serves. APPs include designs and other measures aimed at preventing avian electrocutions, as described in guidance provided by the Avian Power Line Interaction Committee ("APLIC" 2006) and the guidelines for developing APPs (APLIC and USFWS, 2005). The APP for the Minnesota Territory is complete and retrofit actions for areas with potential avian impacts are underway across the territory. Xcel Energy also addresses avian issues related to transmission projects by:

Working with resource agencies such as the MnDNR and the USFWS to identify areas that may be appropriate for marking transmission line shield wires with bird diverters; and

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 Carson's Bay and St. Alban's Bay of Lake Minnetonka and Galpin Lake. Locations where Swan Flight Diverters ("SFDs") will be installed are shown in **Appendix B.2: Segments 3, 4, 5, 6, 8, and 9** *and* **Appendix B.3: Pages 12-18, 20-22, and 25**. 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.

6.6 RARE AND UNIQUE NATURAL RESOURCES

A request for a Natural Heritage Database Search and comments regarding rare species and natural communities for the Project Area was submitted to the MnDNR on February 23, 2010. The results of the MnDNR Natural Heritage Database Search are included in **Appendices B.2, B.3, and D.4: MnDNR NHIS Response**. The following assessment is based on MnDNR response, a review of the Natural Heritage Database that is licensed to Xcel Energy by the MnDNR, and other state and federal rare species and natural community information.

There are 65 known occurrences of rare species and sensitive natural communities within two miles of the Project Area as indicated in **Table 20** below. These include 26 occurrences of 14 vertebrate species, eight occurrences of five invertebrate species, 18 occurrences of 13 vascular plant species, one animal community, ten terrestrial communities, and two ecological features. Twenty-five of the 65 records are located within 0.5 mile of the Project Area and include the Bald eagle, Red-shouldered Hawk, Western Fox snake, Blandings's Turtle, Paddlefish, Shovelnose sturgeon, Rock pocketbook, Yellow sandshell, Marsh Arrow-grass, Sessile-flowered cress, Small White Lady's slipper, Sterile sedge, a bat concentration, a Seepage meadow/Carr, a Calcareous fen (Southern), one native plant community (undetermined class), and ice deposition (quaternary) (Minnesota DNR, 2010). It should be noted that 42 of the 65 records are within two miles of Segment 1, a portion of the project where no structural changes or disturbance will occur as part of the Project.

Table 20
Rare and Unique Resources

Common Name	*Scientific Name*	Type	MN Status [1]	Last Obs.	Proximity (Miles)
American Brook Lamprey*	*Lampetra appendix*	Vertebrate	Not Applicable	2000	0.5-1.0
Bald Eagle	*Haliaeetus leucocephalus*	Vertebrate	SPC	2008	1.0-1.5
Bald Eagle*	*Haliaeetus leucocephalus*	Vertebrate	SPC	2008	0.0-0.5
Black buffalo*	*Ictiobus niger*	Vertebrate	SPC	2003	1.5-2.0
Blanding's Turtle	*Emydoidea blandingii*	Vertebrate	THR	1994	0.0-0.5
Blanding's Turtle	*Emydoidea blandingii*	Vertebrate	THR	1987	1.0-1.5
Blue sucker*	*Cycleptus elongatus*	Vertebrate	SPC	1989	1.5-2.0
Eastern Spotted Skunk	*Spilogale putorius*	Vertebrate	THR	1992	1.5-2.0
Gopher snake*	*Pituophis catenifer*	Vertebrate	SPC	1932	1.5-2.0
Least Darter	*Etheostoma microperca*	Vertebrate	SPC	1992	1.0-1.5
Least Darter	*Etheostoma microperca*	Vertebrate	SPC	2006	0.5-1.0
Least Darter	*Etheostoma micropea*	Vertebrate	SPC	2006	0.5-1.0
Least Darter	*Etheostoma micropea*	Vertebrate	SPC	2006	1.5-2.0
Milk snake*	*Lampropeltis triangulum*	Vertebrate	Not Applicable	1929	1.5-2.0
Paddlefish*	*Polyodon spathula*	Vertebrate	THR	2004	0.0-0.5
Pugnose Shiner	*Notropis anogenus*	Vertebrate	SPC	1941	0.5-1.0
Pugnose Shiner	*Notropis anogenus*	Vertebrate	SPC	1991	1.5-2.0
Red -shouldered Hawk	*Buteo lineatus*	Vertebrate	SPC	1989	0.0-0.5
Red -shouldered Hawk	*Buteo lineatus*	Vertebrate	SPC	1996	0.0-0.5
Red -shouldered Hawk	*Buteo lineatus*	Vertebrate	SPC	1993	0.0-0.5
Red -shouldered Hawk	*Buteo lineatus*	Vertebrate	SPC	1994	0.0-0.5
Shovelnose Sturgeon*	*Scaphirhynchus platorynchus*	Vertebrate	Not Applicable	1987	0.0-0.5

Common Name	*Scientific Name*	Type	MN Status [1]	Last Obs.	Proximity (Miles)
Shovelnose Sturgeon*	*Scaphirhynchus platorynchus*	Vertebrate	Not Applicable	1999	0.0-0.5
Shovelnose Sturgeon*	*Scaphirhynchus platorynchus*	Vertebrate	Not Applicable	1982	0.5-1.0
Shovelnose Sturgeon*	*Scaphirhynchus platorynchus*	Vertebrate	Not Applicable	1998	0.5-1.0
Western Fox Snake	*Elaphe vulpina*	Vertebrate	Not Applicable	1939	0.0-0.5
Mucket*	*Actinonaias ligamentina*	Invertebrate	THR	1989	1.0-1.5
Mucket*	*Actinonaias ligamentina*	Invertebrate	THR	1989	1.0-1.5
Regal fritillary*	*Speyeria idalia*	Invertebrate	SPC	1975	1.5-2.0
Rock Pocketbook*	*Arcidens confragosus*	Invertebrate	END	2006	0.0-0.5
Rock pocketbook*	*Arcidens confragosus*	Invertebrate	END	1989	1.0-1.5
Wartyback*	*Quadrula nodulata*	Invertebrate	END	2000	1.0-1.5
Yellow Sandshell*	*Lampsilis teres*	Invertebrate	END	1989	0.0-0.5
Yellow Sandshell*	*Lampsilis teres*	Invertebrate	END	1989	1.0-1.5
American Ginseng*	*Panax quinquefolius*	Vascular Plant	SPC	1995	0.5-1.0
American Ginseng	*Panax quinquefolius*	Vascular Plant	SPC	1995	1.0-1.5
Beaked Spike-rush*	*Eleocharis rostellata*	Vascular Plant	THR	1992	0.5-1.0
Dragon's Mouth	*Arethusa bulbosa*	Vascular Plant	Not Applicable	1931	1.5-2.0
Dwarf Trout Lily	*Erythronium propullans*	Vascular Plant	END	2007	1.5-2.0
Dwarf Trout Lily	*Erythronium propullans*	Vascular Plant	END	2007	1.5-2.0
Dwarf Trout Lily	*Erythronium propullans*	Vascular Plant	END	2007	1.5-2.0
Dwarf Trout Lily	*Erythronium propullans*	Vascular Plant	END	2007	1.5-2.0
Dwarf Trout Lily	*Erythronium propullans*	Vascular Plant	END	2007	1.5-2.0
Hair-like Beak-rush*	*Rhynchospora capillacea*	Vascular Plant	THR	1990	0.5-1.0
Kitten-tails*	*Besseya bullii*	Vascular Plant	THR	1979	1.5-2.0
Marsh Arrow-grass*	*Triglochin palustris*	Vascular Plant	Not Applicable	1995	0.0-0.5
Sessile-flowered Cress*	*Rorippa sessiliflora*	Vascular Plant	SPC	1891	0.0-0.5
Small White Lady's-slipper*	*Cypripedium candidum*	Vascular Plant	SPC	1995	0.0-0.5
Sterile Sedge*	*Carex sterilis*	Vascular Plant	THR	1995	0.0-0.5
Twig-rush*	*Cladium mariscoides*	Vascular Plant	SPC	1992	0.5-1.0
Valerian*	*Valeriana edulis var. ciliata*	Vascular Plant	THR	1992	0.5-1.0
Whorled nut-rush*	*Scleria verticillata*	Vascular Plant	THR	1990	0.5-1.0
Bat Concentration*	*Bat Colony*	Animal Community	Not Applicable	2000	0.5-1.0
Ice deposition (quaternary)	*Not Applicable*	Other	Not Applicable	1977	0.0-0.5
Kettle (quaternary)	*Not Applicable*	Other	Not Applicable	1980	1.5-2.0
Native Plant Community*	*Not Applicable*	Terrestrial Community	Not Applicable	1995	1.0-1.5
Dry Hill Prairie (Southern)*	*Dry Hill Prairie (Southern)Type*	Terrestrial Community	Not Applicable	1995	0.5-1.0
Native Plant *Community	*Native Plant Community, Undetermined Class*	Terrestrial Community	Not Applicable	1995	0.5-1.0

Common Name	*Scientific Name*	Type	MN Status [1]	Last Obs.	Proximity (Miles)
Native Plant Community*	*Native Plant Community, Undetermined Class*	Terrestrial Community	Not Applicable	1995	0.5-1.0
Native Plant Community*	*Native Plant Community, Undetermined Class*	Terrestrial Community	Not Applicable	1995	0.5-1.0
Native Plant Community	*Native Plant Community, Undetermined Class*	Terrestrial Community	Not Applicable	1995	1.0-1.5
Northern Poor Fen	*Northern Poor Fen Class*	Terrestrial Community	Not Applicable	1992	1.5-2.0
Calcareous Fen* (Southeastern)	*Calcareous Fen (Southeastern)Type*	Terrestrial Community	Not Applicable	1995	0.0-0.5
Native Plant* Community	*Native Plant Community, Undetermined Class*	Terrestrial Community	Not Applicable	1995	0.0-0.5
Seepage Meadow/Carr*	*Seepage Meadow/Carr*	Terrestrial Community	Not Applicable	1995	0.0-0.5

[1] SPC = State-listed Special Concern, THR = Threatened,END=Endangered (Minnesota DNR 2007)
***Denotes records within 2.0 miles of Segment 1.**

Mitigative Measures

The Project and construction process will be designed to avoid encroachment and effects on rare species and unique natural resources to the extent practicable. If rare species or unique natural resources will be affected, Xcel Energy will 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 search for previously unrecorded Bald Eagle nests in proximity to the Project Area. This survey revealed that no new nests were identified. 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 AGENCY INVOLVEMENT, PUBLIC PARTICIPATION AND REQUIRED PERMITS AND APPROVALS

7.1 AGENCY CONTACTS

Xcel Energy sent letters to various regulatory and governmental authorities to request review of the Project Area for applicable comments and concerns. See **Appendix D.1**. Xcel Energy also sent letters to local governmental units ("LGUs") within the Project Area giving LGUs notice of the Project, requesting comments, and allowing LGUs the opportunity to request a meeting to discuss the Project. See **Appendix D.2**.

7.1.1 United States Fish and Wildlife Service

Xcel Energy sent a letter to the USFWS on May 20, 2010 and January 20, 2011, requesting a review of the Project Area for federally listed threatened and endangered species. Richard Davis from the USFWS responded via email on September 29, 2010. Mr. Davis indicated no records of federally listed threatened or endangered species were found within the Project Area. Bird diverters were recommended for the transmission near watercourses, waterbodies, wooded areas, and grasslands. Mr. Davis also recommended an eagle nest survey along the Proposed Route. See **Appendix D.3** for the comments of USFWS.

Xcel Energy plans to install swan flight diverters on the static overhead line in areas where the transmission line is adjacent to or crosses wetlands and water bodies. A field survey was completed in November 2010 to search for previously unrecorded Bald Eagle nests in proximity to the Project Area. No eagle nests were noted. Xcel Energy will survey the Project Area again for eagle nests prior to construction.

7.1.2 Minnesota Department of Natural Resources

Xcel Energy sent letters to the MnDNR Natural Heritage and Nongame Research Program on February 23, 2010 requesting a review of the Project Area for state threatened and endangered species and rare natural features. In the MnDNR's response dated April 2, 2010, the MnDNR identified certain rare species and features that might be affected by the proposed Project. Those species and features are addressed in Section 6.6 of this Application. See **Appendix D.4** for the comments from the MnDNR.

7.1.3 Minnesota Department of Transportation

Xcel Energy sent a letter to the Minnesota Department of Transportation ("MnDOT") on May 20, 2010 and January 20, 2010, requesting comments on the proposed Project. On June 10, 2010, Xcel Energy received comments from MnDOT related to the proposed Project (See **Appendix D.5**). MnDOT indicated the need for a preliminary schedule for

construction and the need for a Long Form Permit for any use of or work within the MnDOT right-of-way. As discussed in Section 6.2.10, utility work within MnDOT right of ways should be designed based on that agency's Accommodation Policy.

MnDOT right-of-ways within the Project Area vary in width from 46 to 74 feet along the proposed route. Generally, if Xcel Energy is working in an area greater than 100 feet from the centerline of the roadways, no MnDOT permit will be required. Xcel Energy will work with MnDOT and determine which areas of the Project will require a MnDOT permit as the Project moves forward.

7.1.4 Army Corps of Engineers ("USACE")

Xcel Energy sent a letter to the Corps of Engineers ("USACE") on May 20, 2010, requesting comments on the proposed Project. On June 4, 2010, Xcel Energy received comments from USACE related to the proposed Project (See **Appendix D.6**). Tamara Cameron, Regulatory Branch Chief of the St. Paul District, did not provide specific comment on the Project, but did offer several issues to consider regarding the need for USACE permits for impacts to navigable waters of the United States, dredge or fill of navigable waters, and compliance with NEPA. The Project design is not anticipated to involve such impacts, with the exception of potential wetland impacts, that may be within USACE jurisdiction as navigable waters of the United States. Any applicable permits needed for wetland impacts will be processed through the USACE as well as the local governmental unit.

7.1.5 Carver, Hennepin, and Scott Counties, Townships and Cities

On January 20, 2011 Xcel Energy sent letters to representatives of Carver and Hennepin counties and the cities of Chanhassen, Deephaven, Eden Prairie, Excelsior, Greenwood, Minnetonka, and Shorewood requesting comments on the proposed Project. On October 13, 2009, Xcel Energy met with representatives from Carver and Hennepin counties to introduce the Project. The county staffs were generally in favor of the need for the Project, requested to be updated on further Project developments and informed of any scope changes. Xcel Energy will continue working with local governments on the Project. Xcel Energy sent letters to the representatives of the City of Chaska, Scott County, and Jackson County on January 13, 2012 requesting comments on the proposed Project. See **Appendix D.7** for the comments from the Hennepin County and **Appendix D.8** for the comments from the cities of Deephaven and Greenwood.

7.2 IDENTIFICATION OF LANDOWNERS

A list of the landowners within and adjacent to the proposed transmission line rebuild route is included in **Appendix E.1**. Addresses have been redacted from the landowner list and comment forms due to privacy concerns.

7.3 PUBLIC PARTICIPATION

Xcel Energy held public informational meetings at both the Eden Prairie Community Center in Eden Prairie, Minnesota on January 10, 2011, and the Bayview Event Center in Excelsior, Minnesota on January 13, 2011, prior to developing this Application. These meetings were held to inform landowners and public officials of the proposed Project and solicit input to be used in route selection. A notice for the public informational meetings were published in the Chanhassen Villager, Eden Prairie News, Eden Prairie Sun, Excelsior Shorewood Chanhassen Sun, and Minnetonka Deephaven Hopkins Sun on December 30, 2010. A copy of the newspaper notice is included in **Appendix E.2**.

Approximately 80 people attended the informational meetings. A copy of the attendance forms is included in **Appendix E.3**. Project information literature that was provided at the meetings is included in **Appendix E.4**. All the public comments that were received are included in **Appendix E.5**.

Generally, public interest focused primarily on the structure design details of the transmission line rebuild and the proximity of the transmission line to private residences and public facilities. No written comments have been received from the public. Xcel Energy will continue to work with the public throughout the routing process.

7.4 REQUIRED PERMITS AND APPROVALS

Federal, state, and local permits that could potentially be required for the Project are identified below in **Table 21**.

Table 21
Potential Required Permits

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

7.4.1 Federal Permits

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers ("USACE") administers the regulatory programs of the federal Clean Water Act and the Rivers and Harbors Act. The USACE may require authorization of the Project under the utility line discharge provision of a Regional General Permit (RGP-3-MN).

7.4.2 State of Minnesota Permits

Minnesota Public Utilities Commission

Minnesota Statutes Section 216E.03, subd. 2. provides that no person may construct a high-voltage transmission line without a route permit from the Commission.

Minnesota Statutes Section 216B.243, subd. 2 states that no large energy facility shall be sited or constructed in Minnesota without the issuance of a CON by the Commission. The 115 kV transmission line proposed for the Project is a "large energy facility" because it has a capacity in excess of 100 kV and is more than 10 miles long. Xcel Energy submitted a CON with the Commission on March 9, 2012.

Minnesota Department of Natural Resources

The MnDNR Division of Lands and Minerals regulates utility crossings on, over or under any state land or public water identified on the Public Waters and Wetlands Maps. A license to cross Public Waters is required under Minnesota Statutes Section 84.415 and Minnesota Rules Chapter 6135. Xcel Energy works closely with the MnDNR on these permits and will

file for them once the line design is complete. 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.

Minnesota Department of Transportation

MnDOT requires the Application for Utility Permit on County Highways Right-of-Way form for the vast majority of utility placements and relocations. Utility owners use this form to request permission to place, construct, and reconstruct utilities within trunk highway right-of-way, whether longitudinal, oblique, or perpendicular to the centerline of the highway. Xcel Energy will determine if such permit is required, and, if so, obtain the permit from the MnDOT.

Minnesota Pollution Control Agency

MPCA requires an NPDES construction storm water permit and Stormwater Pollution Prevention Plan ("SWPPP") for owners or operators of 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. Most construction activities are covered by the general NPDES storm water permit for construction activity, but some construction sites need individual permit coverage. Xcel Energy will determine if such a permit is required, and, if so, obtain the permit from the MPCA.

7.4.3 Local Permits

Once the Commission issues a route permit, zoning, building and land use regulations and rules are preempted under Minnesota Statutes Section 216E.10, subd. 1.

Carver, Hennepin, and Scott Counties

Carver, Hennepin, and Scott counties locally administer the Minnesota Wetland Conservation Act ("WCA") on some portions of the Project. 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 certification of wetland replacement could be required. Carver, Hennepin, and Scott counties may also require a county road access permit.

Municipalities

The cities of Chaska, Chanhassen, Greenwood, Deephaven, Eden Prairie, and Minnetonka, Minnehaha Creek Watershed District (MCWD), and Jackson Township are all LGU's that administer the WCA in the Project Area. It is possible that the BWSR representatives for

Carver, Hennepin, and Scott Counties will coordinate with the LGU'S so that one entity administers the WCA over the entire project area. As a utilities project, 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.

8.0 REFERENCES

Avian Power Line Interaction Committee(APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA. http://www.aplic.org/uploads/files/2643/SuggestedPractices2006(LR-2).pdf Accessed November, 2011.

APLIC and USFWS. 2005. *Avian Protection Plan (APP) Guidelines*. Prepared by the Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). http://www.eei.org/ourissues/TheEnvironment/Land/Documents/AvianProtectionPlanGuidelines.pdf Revised April 2005, Accessed November, 2011

Carver County Public Works Department, September 2009. *Carver County Roadway Systems Plan (2010 – 2030) Final Report*.

Coffin, B. and L. Pfannmuller. 1988. *Minnesota's Endangered Flora and Fauna*. University of Minnesota Press, Minneapolis.

Define That. *Voltage Definition*. http://www.definethat.com/define/2052.htm. Accessed November, 2011

Federal Emergency Management Agency. August 18, 1992. Flood Insurance Rate Map of McLeod County, Minnesota and Incorporated Areas.

Hazard, E. B. 1982. *The Mammals of Minnesota*. University of Minnesota Press, Minneapolis.

Hutchinson, MN Community Profile, Minnesota Home Town Locator http://minnesota.hometownlocator.com/mn/mcleod/hutchinson.cfm Accessed January, 2012

Jackson, J., E. Pentecost, and J. Muzzarelli. 1994. *Transmission Line Environmental Assessment Document*. U.S. Department of Energy, Environmental Assessment Division, Argonne National Laboratory. ANL/EAD-TM-3. http://www.osti.gov/energycitations/servlets/purl/10129180-KS7nKu/native/10129180.PDF. Accessed November, 2011.

Janssen, R. B. 1987. *Birds of Minnesota*. University of Minnesota Press, Minneapolis.

Center for North American Herpetology, 2011. *Checklist of Reptiles and Amphibians of Minnesota*. http://www.cnah.org/state_nameslist.asp?state_id=22 Accessed November, 2011.

Minnesota Department of Natural Resources. 2010. *Wildlife Management Areas*. http://www.dnr.state.mn.us/wmas/index.html. Accessed November, 2011

Minnesota Department of Natural Resources. 2010. Endangered, *Threatened, and Special Concern Species*. http://www.dnr.state.mn.us/ets/index.html. Accessed November, 2011

Minnesota Department of Natural Resources. 2010. *Minnesota County Biological Survey Native Plant Community and Rare Species County Maps*. http://www.dnr.state.mn.us/eco/mcbs/maps.html. Accessed November, 2011

Minnesota Department of Natural Resources, 2010. *Ecological Classification System.* http://www.dnr.state.mn.us/ecs/index.html. AccessedNovember, 2011.

Minnesota Department of Natural Resources. 2010. The Minnesota Department of Natural Resources Web Site (online). http://www.dnr.state.mn.us/sitetools/copyright.html. Accessed November, 2011

Minnesota Department of Natural Resources. 2008e. *Public Waters Inventory Maps: Draft ArcView shapefile from DNR FTP site. ftp://ftp.dnr.state.mn.us/pub/dow/pwibasins/*. Accessed August 2008.

Minnesota Department of Transportation Aggregate Unit Office of Materials & Road Research Carver County Aggregate Source Map (2003). Accessed January, 2012 at http://www.dot.state.mn.us/materials/maps/copitmaps/carver.pdf

Minnesota Legislature - Office of the Revisor of Statutes. 2010. *Minnesota Statutes, Laws and Rules*. https://www.revisor.leg.state.mn.us/pubs/. Accessed January, 2012.

Minnesota Pollution Control Agency. 2008. *A Guide to Noise Control in Minnesota*. Revised October, 2008. http://www.pca.state.mn.us/publications/p-gen6-01.pdf

Minnesota Pollution Control Agency. 2009. *Minnesota's State Implementation Plan*. Revised April, 2009. http://www.pca.state.mn.us/publications/aq-sip1-09.pdf

Minnesota Public Utilities Commission. 1998. *Final Report of the Science Advisors to the Minnesota Public Commission: Research Findings and Recommendations Regarding Claims of Possible Effects of Currents in the Earth on Dairy Cow Health and Milk Production.* St. Paul, Minnesota July 1998.

Minnesota State Interagency Working Group on EMF Issues. 2002. *A White Paper on Electric and Magnetic Field (EMF) Policy and Mitigation Options*. St. Paul, Minnesota. September 2002.

Minnesota Department of Transportation, 2010 *County Maps*. http://www.dot.state.mn.us/maps/cadd/county/carver.pdf and http://www.dot.state.mn.us/maps/cadd/county/hennepin.pdf Accessed January, 2012.

Olden, Kenneth. 1999. *1999 NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*. National Institute of Environmental Health Sciences, National Institutes of Health. Research Triangle Park, North Carolina.

PSCW – Public Service Commission of Wisconsin. 2008. *EMF-Electric & Magnetic Fields.* http://psc.wi.gov/thelibrary/publications/electric/electric12.pdf

Toivonen, L.; Valjus, J.; Hongisto, M.; Metso R. 1991. The influence of elevated 50 Hz electric and magnetic fields on implanted cardiac pacemakers: the role of the lead configuration and programming of the sensitivity. Pacing & Clinical Electrophysiology. 14:2114-2122.

TRC Solutions, Inc. 2010. Windsor Substation Project Proponent's Environmental Assessment. Prepared for Pacific Gas and Electric Company. April, 2010 www.cpuc.ca.gov/Environment/info/aspen/**windsor**sub/toc-pea.htm. Accessed November, 2011.

United States Census Bureau. Census 2000 Data. http://www.census.gov/main/www/cen2000.html. Accessed September 2010.

United States Census Bureau. American Factfinder. 2010. http://factfinder2.census.gov. Accessed January, 2012.

United States Department of Agriculture (USDA). *2007. Census of Agriculture Minnesota State and County Profiles: Carver County, Hennepin County, and Scott County.* http://www.agcensus.usda.gov/Publications/2007/County_Profiles/Minnesota/index.asp Accessed November, 2009.United States Department of Agriculture (USDA). *Data Gateway.* http://datagateway.nrcs.usda.gov/. Accessed January, 2012.

U.S. Fish and Wildlife Service. 2004. *National Wetlands Inventory (NWI).* http://www.fws.gov/nwi/. Accessed January, 2012.

U.S. Fish and Wildlife Service. 2008. *County Distribution of Minnesota's Federally Threatened, Endangered, and Candidate Species.* http://www.fws.gov/midwest/endangered/lists/minnesot-cty.html.pdf Accessed January, 2012.

United States Geological Survey. 1993. *The National Map.* http://nationalmap.gov/. Accessed January, 2012.

World Health Organization. 2007. Extremely low frequency fields. Environmental Health Criteria, Vol. 238. Geneva, World Health Organization, 2007.

9.0 DEFINITIONS

Avian	Of or relating to birds.
Breaker	Device for opening a circuit.
Bus	An electrical conductor that serves as a common connection for two or more electrical circuits; may be in the form of rigid bars or stranded conductors or cables.
Conductor	A material or object that permits an electric current to flow easily.
Corona	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
Disconnects	A power switch that can be shut off and then locked in the "off" position.
Electric (E) Field	The field of force that is produced as a result of a voltage charge on a conductor or antenna.
Electromagnetic	The term describing the relationship between electricity and magnetism; a quality that combines both magnetic and electric properties.
Electromagnetic Field ("EMF")	The combination of an electric (E) field and a magnetic (H) field.
Electromotive Force	The force (voltage) that produces an electric current in a circuit.
Excavation	A cavity formed by cutting, digging, or scooping.
Fauna	The collective animals of any place or time that live in mutual association.
Flora	The collective plants of any place or time that live in mutual association.
Grading	To level off to a smooth horizontal or sloping surface.
Grounding	To connect electrically with a ground; to connect some point of an electrical circuit or some item of electrical equipment to earth or to the conducting medium used in lieu thereof.
Habitat	The place or environment where a plant or animal naturally or normally lives and grows.

High Voltage Transmission Lines ("HVTL")	Overhead and underground conducting lines of either copper or aluminum used to transmit electric power over relatively long distances, usually from a central generating station to main substations. They are also used for electric power transmission from one central station to another for load sharing. High voltage transmission lines typically have a voltage of 115 kV or more.
Hydrocarbons	Compounds that contain carbon and hydrogen, found in fossil fuels.
Ionization	Removal of an electron from an atom or molecule. The process of producing ions. The electrically charged particles produced by high-energy radiation, such as light or ultraviolet rays, or by the collision of particles during thermal agitation.
Magnetic (H) Field	The region in which the magnetic forces created by a permanent magnet or by a current-carrying conductor or coil can be detected. The field that is produced when current flows through a conductor or antenna.
Mitigate	To lessen the severity of or alleviate the effects of.
Oxide	A compound of oxygen with one other more positive element or radical.
Ozone	A very reactive form of oxygen that combines readily with other elements and compounds in the atmosphere.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Sediment	Material deposited by water, wind, or glaciers.
Stray Voltage	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. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.
Substation	A substation is a high voltage electric system facility. It is used to switch generators, equipment, and circuits or lines in and out of a system. It also is used to change AC voltages from one level to another. Some substations are small with little more than a transformer and associated switches. Others are very large with several transformers and dozens of switches and other equipment.

Voltage	A unit of electrical pressure, electric potential or potential difference expressed in volts. The term used to signify electrical pressure. Voltage is a force that causes current to flow through an electrical conductor. The voltage of a circuit is the greatest effective difference of potential between any two conductors of the circuit.
Voltage Drop	The difference in voltage between two points; it is the result of the loss of electrical pressure as a current flows through a resistance.
Waterfowl	A bird that frequents water; especially a swimming game bird (as a duck or goose) as distinguished from an upland game bird or shorebird.
Waterfowl Production Area ("WPA")	Waterfowl Production Areas preserve wetlands and grasslands critical to waterfowl and other wildlife. These public lands, managed by the U.S. Fish and Wildlife Service, were included in the National Wildlife Refuge System in 1966 through the National Wildlife Refuge Administration Act.
Wetland	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.
Wildlife Management Area ("WMA")	Wildlife Management Areas are part of Minnesota's outdoor recreation system and are established to protect those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses.

4590111v1