NORTHERN STATES POWER COMPANY

APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A ROUTE PERMIT

for the

KOHLMAN LAKE TO GOOSE LAKE REBUILD FROM 115 kV SINGLE CIRCUIT TO 115/115 kV DOUBLE CIRCUIT TRANSMISSION LINE PROJECT

Alternative Permitting Process
MPUC Docket No. E002/TL-12-1151

January 2013

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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 2.8 miles of existing 115 kilovolt ("kV") single circuit transmission line and replace it with a new 115/115 kV double circuit transmission line in approximately the same alignment and modify two existing substations: Kohlman Lake Substation and Goose Lake Substation (the "Project"). The Project extends from the Kohlman Lake Substation (located near the intersection of Highway 61 and Interstate 694) in the City of Maplewood, north through White Bear Lake and Vadnais Heights, to the Goose Lake Substation (located northwest of the intersection of White Bear Parkway and Otter Lake Road) in White Bear Township. The Project is located in Ramsey County and primarily within existing railroad right-of-way. **Figure 1** shows a general overview map of the proposed Project.

The Project is needed to reliably serve electrical loads in the northwest region of the Twin Cities metro area by providing a redundant electrical transmission source to the area by rebuilding the existing single circuit 115 kV line to a double circuit 115/115 kV transmission line. The Project is also required in order to meet the North American Electric Reliability Corporation ("NERC") planning standards without decreasing load during transmission outages.

Minnesota Statutes Section 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 of a 115 kV single circuit transmission line to a 115/115 kV double circuit transmission line with associated facilities, qualifies for consideration under the Alternative Permitting Process because the proposed new 115/115 kV double circuit transmission line is 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.

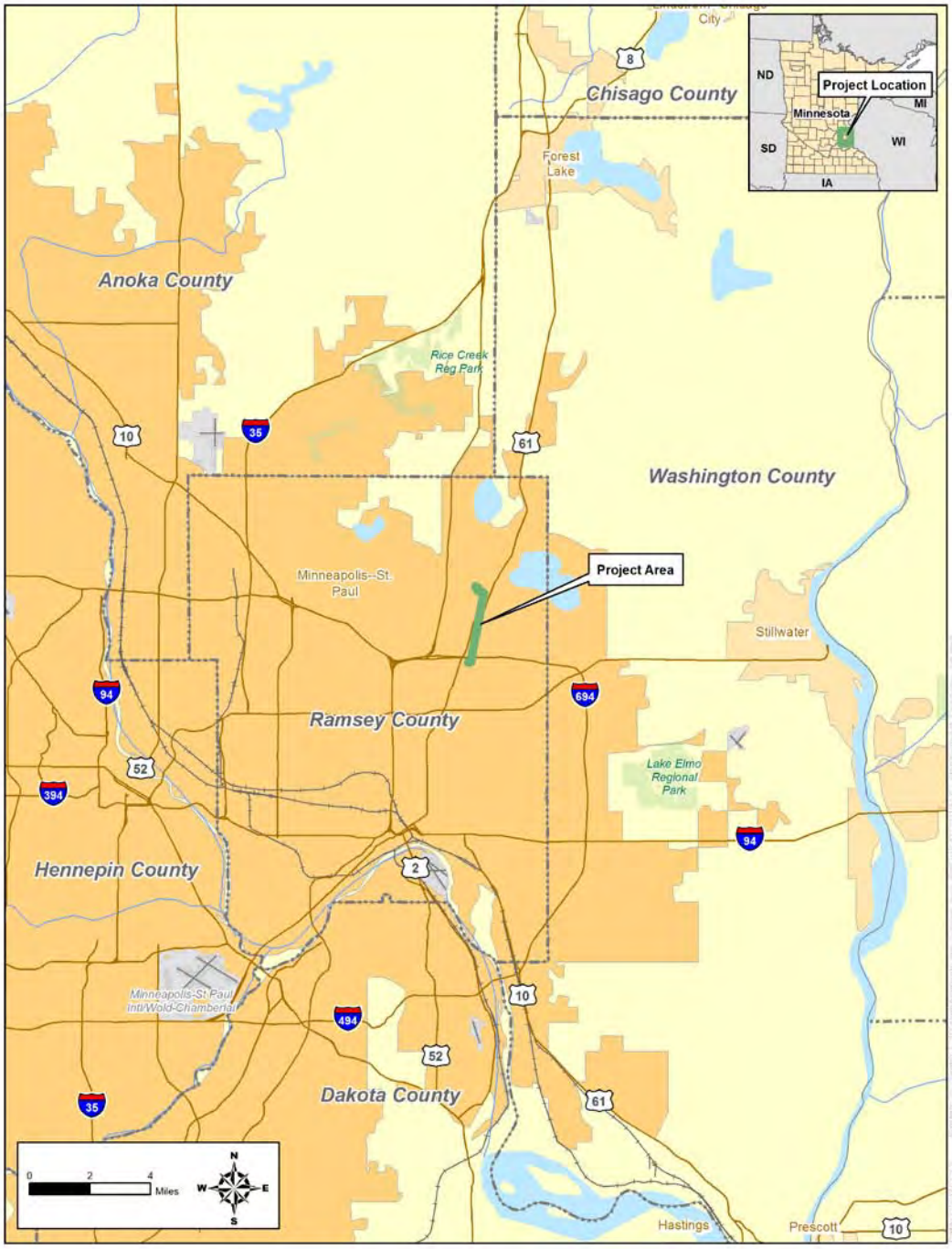
The Applicant requests that the Commission approve the Proposed Route and authorize a route width of 200 feet (i.e., 100 feet on each side of the centerline of the anticipated alignment).

Xcel Energy proposes to rebuild the existing 115 kV single circuit transmission line to a 115/115 kV double circuit transmission line on approximately the existing centerline and within existing railroad right-of-way to the extent possible. The existing railroad right-of-way varies between either 100 or 200 feet wide depending on location. Xcel Energy has an existing license agreement with BNSF

(Permit No. 203, 109; NSP #3681) to construct, operate, and maintain the existing transmission line within the railroad right-of-way. Xcel Energy will work with BNSF to modify the existing license agreement as necessary to accommodate the proposed Project.

For areas along the Proposed Route where new right-of-way is necessary, Xcel Energy will acquire a right-of-way of up to 75 feet wide (37'6" from the centerline of the transmission structures). See **Figure B-10** in **Appendix B** for areas of anticipated new right-of-way acquisition.

FIGURE 1
GENERAL OVERVIEW OF PROPOSED PROJECT LOCATION



1.2 COMPLETENESS CHECKLIST

The content requirements for an application with the Commission under the Alternative Permitting Process are identified under Minn. Stat. § 216E.04, subd. 2(3) and Minn. R. 7850.2900 and 7850.1700. **Table 1** lists the rule requirements and the section where the information can be found in this Application.

TABLE 1
COMPLETENESS CHECKLIST

Authority	Required Information	Section
Minn. R. 7850.2800 Subp. 1(C) – 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.	2.5
Minn. R. 7850.2800, Subp. 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 MPUC of such intent, in writing, at least 10 days before submitting an application for the project.	2.6 and Appendix A
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.	2.5
Minn. R. 7850.1900, Subp. 2 (applicable per Minn. R. 7850.3100) – Route Permit for a High Voltage Transmission Line ("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 Route Permit may be transferred if transfer of the Route Permit is contemplated.	2.3
C.	At least two proposed routes for the proposed HVTL and identification of the preferred route and the reasons for the preference.	Not applicable per Minn. R. 7850.3100. However, *see* 2.5.
D.	A description of the proposed HVTL and all associated facilities, including the size and type of the HVTL.	3.2, 4.1, 4.4, 5.1.1
E.	The environmental information required under Minn. R. 7850.1900, Subp. 3.	Chapter 6.0
F.	Identification of land uses and environmental conditions along the proposed routes.	Chapter 6.0

Authority	Required Information	Section
G.	The names of each owner whose property is within any of the proposed routes for the HVTL.	7.2 and Appendix D.1
H.	U.S. Geological Survey ("USGS") topographical maps or other maps acceptable to the Commission showing the entire length of the HVTL 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 with the proposed HVTL.	4.1, 4.2, 4.3, 5.1.2
J.	The engineering and operational design concepts for the proposed HVTL, including information on the electric and magnetic fields of the HVTL.	Chapter 5.0
K.	Cost analysis of each route, including the costs of constructing, operating and maintaining the HVTL that are dependent on design and route.	3.5
L.	A description of possible design options to accommodate expansion of the HVTL in the future.	4.4
M.	The procedures and practices proposed for the acquisition and restoration of the right-of-way and for construction and maintenance of the HVTL.	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 HVTL.	7.4
O.	A copy of the Certificate of Need or the certified HVTL list containing the proposed HVTL or documentation that an application for a Certificate of Need has been submitted or is not required.	2.4
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
G.	Identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route.	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 mitigation measures.	Chapter 6.0

2.0 INTRODUCTION

2.1 STATEMENT OF OWNERSHIP

Xcel Energy is a Minnesota corporation and 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 currently owns and operates the existing 115 kV single circuit transmission lines (Line #0885 and #5519) and the Kohlman Lake and Goose Lake substations that are the subject of this Application. Xcel Energy will build, and continue to own and operate, the subject facilities.

2.2 REQUESTED ACTION

This Application is submitted under the Alternative Permitting Process under Minn. Stat. §216E.04, subd. 2(3) and Minn. R. 7850.2800 to 7850.3900 (*see* Minn. R. 7850.2800, Subp. 1(C)). Xcel Energy respectfully requests that the Commission approve the Proposed Route for the rebuild from a single circuit 115 kV transmission line to a double circuit 115/115 kV transmission line from the Kohlman Lake Substation to the Goose Lake Substation, and authorize a 200-foot route width along the Proposed Route (*see* **Figure 2**).

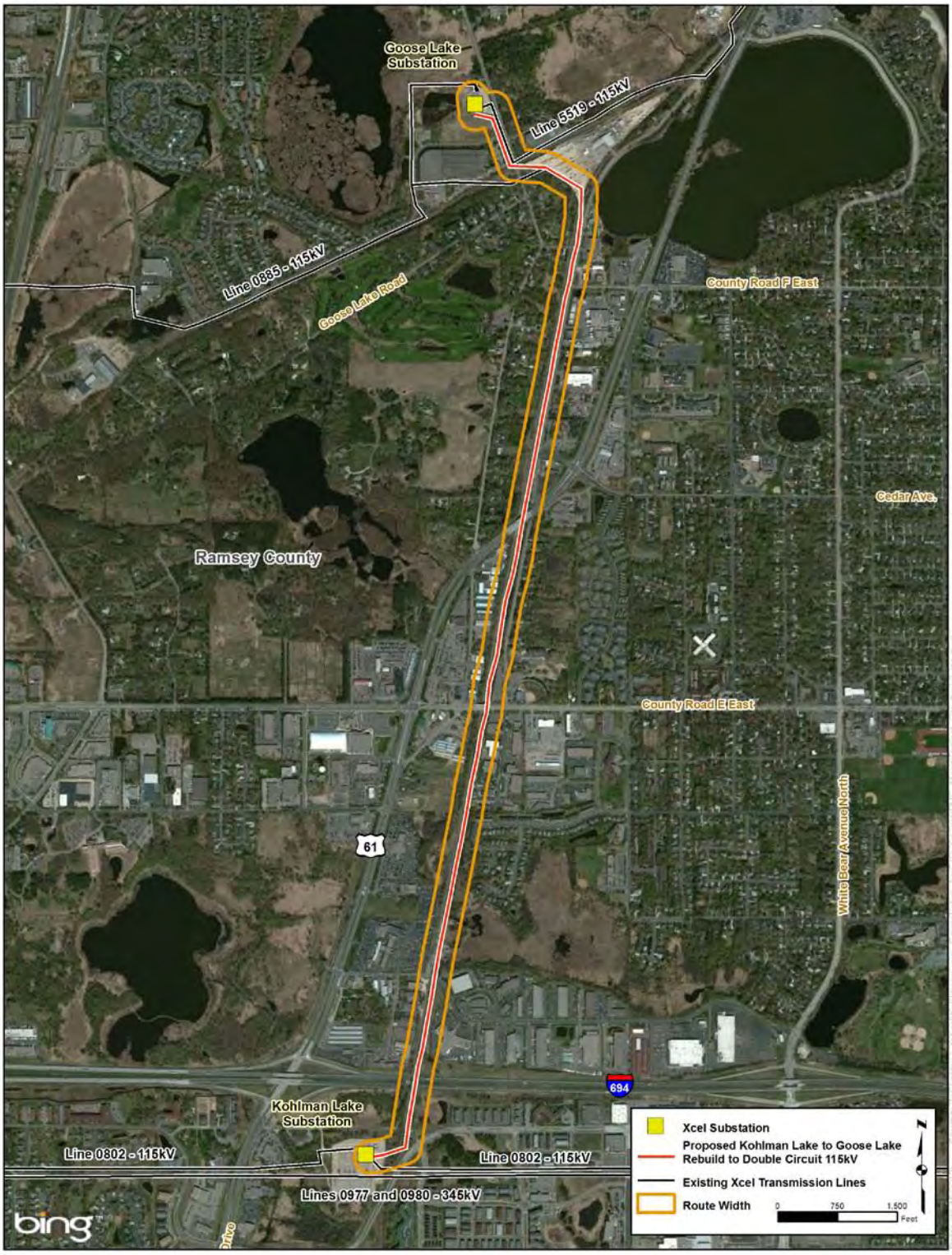
This Application demonstrates that construction of the Project along the Proposed Route will comply with the applicable standards and criteria set forth in Minn. Stat. §216E.03, subd. 7, and Minn. R. 7850.4100. The Project will support the State's goals to conserve resources, minimize environmental and human settlement impacts and land use conflicts by using the existing alignment to the maximum extent feasible, and ensure the State's electric energy security through the construction of efficient, cost-effective transmission infrastructure.

2.3 PERMITTEE

The permittee for the proposed Project is:

Permittee:	Northern States Power Company, a Minnesota corporation
Contact:	Sage Tauber, Permitting Analyst
Address:	Xcel Energy Services, Inc. 414 Nicollet Mall, MP-8 Minneapolis, MN 55401
Phone:	(612) 330-2909
Email:	sage.tauber@xcelenergy.com

FIGURE 2
PROPOSED ROUTE



2.4 CERTIFICATE OF NEED

A Certificate of Need is not required for the Project because it is not classified as a large energy facility ("LEF") under Minn. Stat. Section 216B.243 and 216B.2421, subd. 2(3). While the Project is a high voltage transmission line ("HVTL") with a capacity of 100 kV or more, it is not more than 10 miles long in Minnesota and it does not cross a state line. Therefore, a Certificate of Need is not required.

2.5 ROUTE PERMIT, ALTERNATIVE PERMITTING PROCESS

The Project 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) because the Project is a high voltage transmission line 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.

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 and transportation corridors and thus, best satisfies the routing criteria. The Proposed Route follows existing rights-of-way to the maximum extent feasible. Alternatives to rebuilding a double circuit transmission line within the existing transmission line corridor were rejected because such alternatives would create a new transmission line corridor resulting in new impacts to landowners and environmental resources and would also require acquisition of new easements resulting in higher project costs.

In addition, as discussed in Section 3.3 below, Xcel Energy also considered utilizing operating procedures to mitigate the thermal overloads and severe low voltages in the area. However, adopting operating procedures would be burdensome for the transmission system operators and could reduce the transmission system reliability due to human error. Therefore, this is not considered a reasonable and prudent alternative to the proposed Project and was rejected.

2.6 NOTICE TO COMMISSION

Xcel Energy notified the Commission on October 22, 2012 by letter (mailed and electronically filed) that Xcel Energy intends 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**.

3.0 PROJECT INFORMATION

3.1 PROJECT LOCATION

The Project is located entirely in Ramsey County within the cities of Maplewood, White Bear Lake, Vadnais Heights, and White Bear Township. The southern terminus of the Project is the Kohlman Lake Substation located south of Highway 694, approximately 1,000 feet east of Highway 61 in the City of Maplewood. The northern terminus of the Project is the Goose Lake Substation located approximately 500 feet northwest of the intersection of White Bear Parkway and Otter Lake Road (County Road 148) in White Bear Township (*see* **Figure B-9**).

Figure 1 shows an overview of the Project location and the Proposed Route. **Appendix B** includes detailed maps of the Proposed Route. **Table 2** below identifies the cities and township ("Local Government Units" or "LGUs") in addition to the Public Land Survey ("PLS") designation of areas along the Proposed Route.

TABLE 2
PROJECT LOCATION

City/Township Name	Township (N)	Range (W)	Section(s)
City of Maplewood	T29	R22	3
	T30	R22	34
City of White Bear Lake	T30	R22	22, 27, 34
City of Vadnais Heights	T30	R22	34
White Bear Township	T30	R22	22

3.2 PROJECT PROPOSAL

The proposed Project involves: (1) removing an approximately 2.8-mile segment of existing, single circuit 115 kV transmission line between the Kohlman Lake Substation and Goose Lake Substation; (2) constructing approximately 2.8 miles of new double circuit 115/115 kV transmission line in approximately the same alignment as the line to be removed; and (3) associated modifications to the Kohlman Lake Substation and Goose Lake Substation.

The proposed Project is described in more detail below:

1. <u>Remove Existing 115 kV Single Circuit Transmission Line (Line #0885)</u>

The Project involves removing approximately 2.8 miles of existing single circuit 115 kV transmission line between Kohlman Lake Substation and Goose Lake Substation (Line #0885).

Approximately forty-one (41) existing single circuit structures will be removed beginning at structure #124 (a lattice tower structure located east of Otter Lake Road inside of the Interstate Lumber Company fence) and continuing south to the Kohlman Lake Substation (see **Figure B-8**). The structures to be removed consist of two (2) dead-end lattice towers with concrete spread footings, thirty-eight (38) painted steel poles on drilled pier concrete foundations, and one (1) direct embedded steel pole.

2. Construct New 115/115 kV Double Circuit Transmission Line (Line #0885)

The Project involves constructing approximately 2.8 miles of new double circuit capable steel poles on drilled pier concrete foundations in approximately the same alignment as the structures to be removed (described above). Additionally, approximately 2.8 miles of new wires will be installed between Kohlman Lake Substation and Goose Lake Substation to replace the shield wire and conductors proposed to be removed.

The new steel poles will have a vertical davit arm configuration with one shield wire and three phases on each side. It is anticipated that thirty-eight (38) weathering or galvanized steel, self-supporting tangent structures and four (4) weathering or galvanized steel self-supporting dead-end structures will be required. An additional structure will be installed within the Kohlman Lake Substation to modify the alignment and avoid conductors from passing over the existing control building.

Circuit #1

Circuit #1 will be located on the west side of the new double circuit structures along with the steel shield wires, which will consist of one (1) 3/8"-7 EHS steel and one (1) AC-64/528 24 fiber optical ground wire ("OPGW"). The conductor will be a single 795 ACSS 26/7 conductor per phase with a summer line rating of 1811 amps with a 4 foot per second wind.

Circuit #1 extends from the Kohlman Lake Substation to structure #124. A single span of existing 115 kV bundled conductor will be replaced with new 115 kV conductor between structure #124 and structure #123 (see **Figure B-8**).

Circuit #2

Circuit #2 will be located on the east side of the new double circuit structures with Circuit #1 from the Kohlman Lake Substation to structure #124. The steel shield wires will consist of one (1) 3/8"-7 EHS steel and one (1) AC-64/528 24 fiber optical ground wire ("OPGW"). The conductor will be a single 795 ACSS 26/7 conductor per phase with a summer line rating of 1811 amps with a 4 foot per second wind.

From structure #124, Circuit #2 continues as a single circuit for one span to the existing Line #5519 structure #629 (see **Figure B-8**). From structure #629 to the Goose Lake Substation (approximately 0.2 miles), five (5) existing single circuit structures with distribution underbuild, two

overhead stub guy poles, and all of the guy/anchors along this segment will be removed and four (4) new double circuit capable structures with distribution underbuild will be constructed. Circuit #2 will be located on the west side of these new double circuit structures and existing Line #5519 will be moved onto the east side of the new double circuit structures.

It is anticipated that the four new double circuit structures will consist of two (2) weathering or galvanized steel self-supporting tangent structures, one (1) weathering or galvanized steel self-supporting typical dead-end corner structure, and one (1) weathering or galvanized steel self-supporting special dead-end corner structure.

The shield wires will consist of one (1) AC-64/528 24 fiber OPGW for Line #5519 and one (1) AC-64/528 24 fiber OPGW for Circuit #2. The OPGW for Line #5519 will be transferred to the new double circuit structures. The existing 795 ACSS 26/7 conductor will be replaced with new 795 ACSS 26/7 conductor with a summer line rating of 1811 amps with a 4 foot per second wind. This will eliminate the need for need for splices and allow for a change in tension.

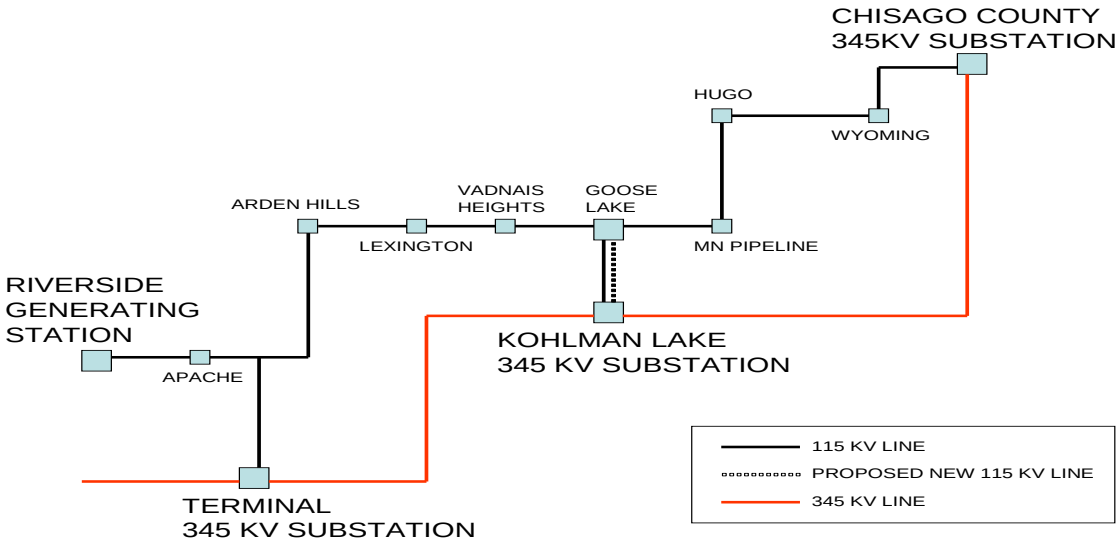
3. <u>Modifications to Goose Lake Substation and Kohlman Lake Substation</u>

Proposed modifications to existing substations are described in Section 4.4.

3.3 NEED FOR PROJECT

The electrical loads in the northwest region of the Twin Cities metro area, consisting of Arden Hills, Vadnais Heights, Hugo, and Wyoming, are served from three sources: Chisago County, Kohlman Lake, and Riverside/Terminal substations. The existing transmission system is illustrated in **Figure 3** below. Recent planning studies completed in 2010 for voltage stability and compliance with NERC TPL-003 standard identified this area as being vulnerable to severe low voltages and thermal overloads.

FIGURE 3
EXISTING TRANSMISSION SYSTEM



The double line outages listed above are classified as North American Electric Reliability Corporation (NERC) Category C3 contingencies. Based on the NERC TPL-003 standard, during a Category C3 contingency unacceptable system conditions, such as thermal overloads or low voltages, are not acceptable. NERC TPL-003 standard would allow load shedding as solution to meet the standard, however this would severely impact the reliability of service to customers in the Northeast Metro. In addition, Xcel Energy also considered utilizing operating procedures to mitigate the thermal overloads and severe low voltages in the area. In order to address all the deficiencies sufficiently, three new operating procedures would have to be implemented for different first contingencies. Adopting operating procedures would be burdensome for the transmission system operators and could reduce the transmission system reliability due to human error.

The proposed Project is to rebuild the existing 115 kV single circuit transmission line from the Kohlman Lake Substation to the Goose Lake Substation to a double circuit 115/115 kV transmission line. This will provide a redundant source into the northwestern part of the Twin Cities metro area, thereby eliminating the need to shed load or to implement operating procedures to meet the NERC planning standards.

Double circuiting the new 115 kV line from Kohlman Lake to Goose Lake with the existing 115 kV circuit would meet the TPL-003 standard. NERC TPL-003 standard defines an outage of any two electrical elements (lines or transformers or generators) as a Category C3 contingency and an outage of double circuit lines (greater than 1 mile) as a Category C5 contingency. The TPL-003 standard requires mitigation of deficiencies associated with C3 contingencies or C5 contingencies. However,

it does not require mitigating the deficiencies resulting due to a Category C3 contingency combined with Category C5 contingency.

The loss of both the circuits between Kohlman Lake and Goose Lake would be classified as a Category C5 contingency, but because the contingency does not result in any low voltage or overload violations, it is acceptable to build both circuits on the same structures.

The loss of only one of the two circuits between Kohlman Lake and Goose Lake combined with the loss of any other transmission line (Chisago County Source or Terminal/Riverside source) is considered a Category C3 contingency. Due to the proposed second 115 kV circuit between Kohlman Lake and Goose Lake, no thermal or voltage violations were identified due to these Category C3 contingencies.

The loss of the double circuit from Kohlman Lake to Goose Lake combined with the loss of any other transmission line (Chisago County Source or Terminal/Riverside source) could be classified as a Category D contingency. NERC does not require deficiencies caused by Category D contingencies to be mitigated as they are considered extreme events.

3.4 PROJECT SCHEDULE

Construction of the Project is expected to begin soon after permits are obtained with an in-service date of summer 2015. 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 COST

The estimated overall cost of the proposed Project is approximately $9.3 million. Xcel Energy provides this estimate with a plus or minus 30 percent accuracy. Therefore, the total Project cost could be between $6.5 million and $12.1 million. Cost estimates for proposed substation and transmission line improvements are provided in **Table 3** below.

TABLE 3
ESTIMATED PROJECT COST

Project Portion	Cost in Million $
Transmission Line Rebuild	$ 5.4
Substation Modifications	$ 3.9
Total Cost Estimate	$ 9.3

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).

Xcel Energy 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 proposed Project includes rebuilding an existing single circuit 115 kV line to a double circuit 115/115 kV transmission line between Kohlman Lake Substation (located south of Highway 694, approximately 1,000 feet east of Highway 61 in the City of Maplewood), and Goose Lake Substation (located approximately 500 feet northwest of the intersection of White Bear Parkway and Otter Lake Road (County Road 148) in White Bear Township). The Proposed Route covers a total of approximately 2.8 miles and primarily follows existing transmission line corridors.

The Proposed Route is located within or adjacent to existing rights-of-way of railroads, utilities, roads, and highways for approximately 95 percent of its length with the remainder of the Proposed Route crossing commercial/industrial, residential, and wooded areas. The entire Proposed Route traverses developed land with the exception of approximately one percent of the Proposed Route comprised of open space and less than 0.1 percent of forested land. The Proposed Route traverses land zoned primarily for highway, commercial, or development land use purposes (*see* Section 6.2.2).

The Proposed Route is located within the Burlington Northern Santa Fe ("BNSF") railroad right-of-way for approximately 91% of its length. Xcel Energy has an existing license agreement with BNSF (Permit No. 203, 109; NSP #3681) to construct, operate, and maintain the existing transmission line within railroad right-of-way. Xcel Energy will work with BNSF to modify the existing license agreement as necessary to accommodate the proposed Project.

Approximately 4.5% of the route corridor is located within the City of Maplewood municipal boundary, 58.8% is located within the City of White Bear Lake, 9.2% is located within the City of Vadnais Heights, and 9.4% is located within White Bear Township. The remaining 18% of the Proposed Route is located on unincorporated land.

The proposed transmission line specifications are included in Sections 3.2 and 5.1.1. A detailed description of the Proposed Route is provided in **Table 4** below. **Figure B-1** in **Appendix B** provides an overview of the Proposed Route and **Figures B-3 to B-8** provide more detail on the Proposed Route.

TABLE 4
DETAILED DESCRIPTION OF PROPOSED ROUTE

Route Direction	Approximate Length (miles)	Road and Public Water Crossings
Line 0855, Double Circuit: EAST-NORTHEAST from Kohlman Lake Substation to Bruce Vento Trail	0.12	--
NORTH-NORTHEAST adjacent to Bruce Vento Trail to Interstate Highway I-694	0.12	Interstate Highway I-694
NORTH-NORTHEAST from Interstate Highway I-694 along Burlington Northern Santa Fe Railroad easement to Buerkle Road	0.25	Buerkle Road
NORTH-NORTHEAST from Buerkle Road along Burlington Northern Santa Fe Railroad easement to unnamed drainage ditch	0.15	Unnamed Drainage Ditch
NORTH-NORTHEAST from unnamed drainage ditch along Burlington Northern Santa Fe Railroad easement to County Road E East	0.50	County Road E East
NORTH-NORTHEAST from County Road E East along Burlington Northern Santa Fe Railroad easement to Highway 61	0.45	Highway 61
NORTH-NORTHEAST Highway 61 along Burlington Northern Santa Fe Railroad easement to rail spur that diverges to the northwest	0.75	--
NORTHWEST to WEST-NORTHWEST along the rail spur the west side of Otter Lake Road (County Road 148)	0.18	Otter Lake Road (County Road 148)
NORTH-NORTHWEST along Otter Lake Road (County Road 148) near the Goose Lake Substation	0.22	--
WEST-SOUTHWEST into the Goose Lake Substation	<0.03	--
Total Proposed Route Length	**2.8 miles**	

4.2 ROUTE WIDTH AND ALIGNMENT SELECTION PROCESS

The Proposed Route was developed by Xcel Energy's permitting and engineering personnel based on their investigation of the overall Project and input from government entities and the public. The Applicant also performed an analysis of environmental resources along the Proposed Route by using computer mapping, aerial photographs, and topographic maps. Environmental resources identified along the Proposed Route are discussed in Sections 6.5 and 6.6 of this Application. The Proposed Route is designed to best minimize the overall impacts of the Project.

On March 7, 2012, Xcel Energy provided Project information and requested comments from Local Government Units ("LGUs") located within the vicinity of the Proposed Route. See Section 7.1 and **Appendix C** of this Application for additional information.

A public open house meeting was held at Best Western White Bear Country Inn in White Bear Lake, Minnesota on June 6, 2012. A notice of the open house meeting was published on May 23, 2012 in the North St. Paul Review and the White Bear Press (see **Appendix D.2)**. Three people signed the attendance sheet for this open house meeting (see **Appendix D.3)**. The attendees focused primarily on the location of the transmission line upgrade, construction timing, vegetation removal, and the aesthetics of the proposed double-circuit structures.

The Proposed Route was 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.

Xcel Energy believes the Proposed Route for the Project best meets the objectives stated above. In particular, the Proposed Route maximizes the use of an existing transmission line corridor and railroad right-of-way, which minimizes impacts to residences and environmental and sensitive resources.

"Route Width" vs. "Right-of-Way"

The Power Plant Siting Act ("PPSA"), Minn. Stat. Chapter 216E, directs the Commission to locate transmission lines in a manner that "minimize[s] adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring their electric needs are met and fulfilled in an orderly and timely fashion." Minn. Stat. § 216E.02, subd. 1. The PPSA also authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues a Route Permit. The route may have "a variable width of up to 1.25 miles" within which the right-of-way for the facilities can be located (Minn. Stat. § 216E.01, subd. 8).

The purpose of the route permitting process is not to establish an exact centerline for a transmission line, but rather, to establish a general alignment that best balances competing land uses and minimizes human and environmental impacts. Once a route is established by the Commission, the utility then prepares more detailed engineering plans and contacts landowners to gather additional detailed information about the circumstances of their property. Only after considering all input does the utility establish an exact centerline of the transmission line and determine specific pole placement locations within the area of the approved route width. A route designation by the Commission should be wide enough to provide flexibility for the utility to work with landowners to adjust final design. Once the utility establishes a centerline and structure placement, construction

drawings are provided to the Commission so the Commission can confirm that the utility's plans are consistent with the route permit. At the same time, a route designation cannot be so wide that it is unclear what the intended general alignment of the transmission line is meant to be.

For purposes of this Application, Xcel Energy requests that the Commission approve the Proposed Route and authorize a route width of 200 feet (i.e., 100 feet on each side of the centerline of the anticipated alignment). Detailed maps of the Proposed Route and route width are provided as **Figures B-3** to **B-8** in **Appendix B**.

The route width is the area in which the utility is allowed to complete the final design. The right-of-way ("ROW"), on the other hand, is the specific area that is actually required for the final easement for the transmission line. An illustrative schematic of this concept is provided in **Figure 4**.

In this case, the requested route width is 200 feet. However, the ROW actually needed for the transmission line facilities is only 75 feet wide, and may be even less in areas where the transmission line can share ROW with other infrastructure such as railroads, roads or highways, or in areas where the ROW for the existing transmission line is being utilized. Requesting a route width wider than the actual ROW needed gives the utility flexibility to make alignment adjustments to work with individual landowners, avoid sensitive natural resource or cultural resource areas, and to manage construction constraints such as steep slopes, poor soils, or existing infrastructure. The illustrative schematic in **Figure 4** shows an example of how alignment adjustments within the route width are necessary to avoid existing infrastructure (e.g., sewer main).

Although Xcel Energy has presented an anticipated alignment in this application (i.e., where the transmission line is expected to be located given the overall Project analysis performed to date), as further information is gathered and comments are received throughout the permit review process, the anticipated alignment may change slightly in any given area within the approved route width. For example, transmission structures may be relocated from the anticipated alignment to elsewhere within the approved route width to minimize necessary tree removal, and/or avoid wetlands or other sensitive habitats. Detailed maps showing the anticipated alignment and the requested route width are included in **Appendix B**.

FIGURE 4
ROUTE WIDTH VS RIGHT-OF-WAY ILLUSTRATIVE SCHEMATIC

Route Width

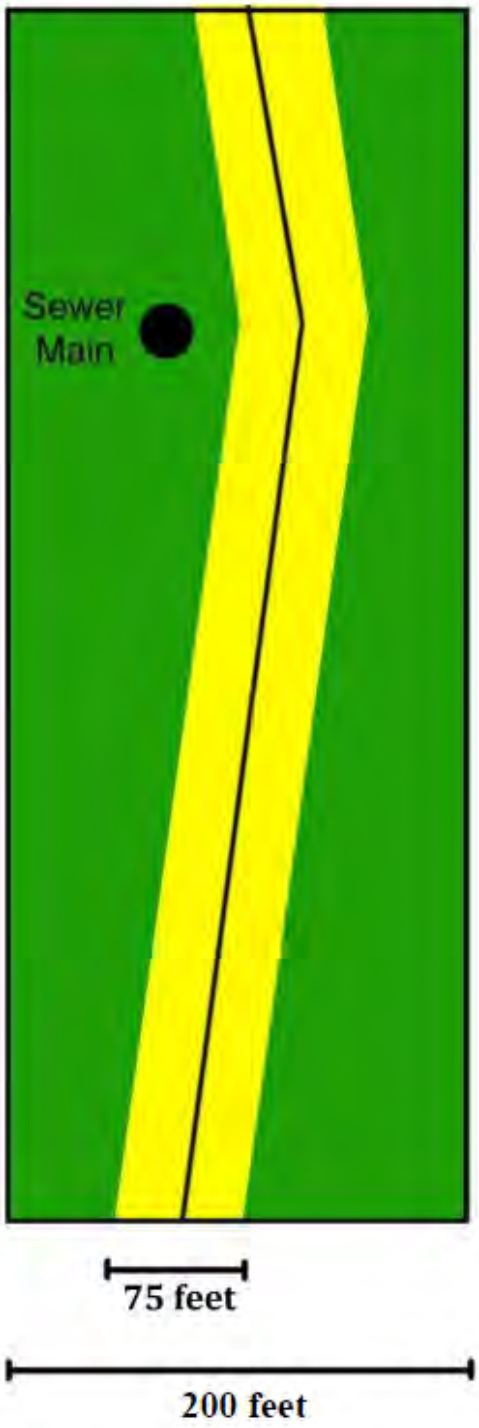
The route width is the area in which the utility is allowed to complete the final design

Right-of-Way (ROW)

The right-of-way is the specific area that is actually required for the final easement for the transmission line.

Anticipated Alignment

Expected location of the transmission line based on project analysis.



4.3 SUBSTATION MODIFICATIONS

4.3.1 Kohlman Lake Substation

Modifications to the existing Kohlman Lake Substation will include the addition of a new 115 kV breaker-and-a-half bay, and two new 115 kV, 3000A, gas circuit breakers and associated breaker isolation disconnects. Additionally, two new panels for primary and secondary relaying and breaker control and protection will be installed, as well as associated steel, foundations, grounding, control cables, and conductor. *See* **Figure E.1** in **Appendix E**. All proposed substation modifications will take place within the existing graded area; no additional grading, expansion, or land acquisition will be required for this portion of the Project.

4.3.2 Goose Lake Substation

Modifications to the existing Goose Lake Substation will include the installation of two new 115 kV, 2000A, gas circuit breakers and associated breaker isolation disconnects, as well as other associated equipment to convert the existing bus configuration to a four breaker ring bus. Additionally, modifications will include the addition of associated steel, foundations, grounding, control cables, and conductor. *See* **Figure E.2** in **Appendix E**. All proposed substation modifications will take place within the existing graded area; no additional grading, expansion, or land acquisition will be required for this portion of the Project.

4.4 DESIGN OPTIONS TO ACCOMMODATE FUTURE EXPANSION

The proposed 115/115 kV double circuit transmission line is 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

Galvanized or weathering steel single-pole double-circuit structures with a vertical davit arm configuration with one shield wire and three phases on each side are proposed to be used for the majority of the Project. The typical tangent structures will be approximately 80-90 feet high and will be supported by a 6-foot diameter by 25-foot deep drilled pier concrete foundation. The average span length between tangent structures will be approximately 300 to 500 feet, which, in some areas, may be slightly longer than the existing span length, thereby resulting in potentially fewer total structures.

The Project also involves removing five existing single circuit structures with distribution underbuild and constructing four new double circuit structures to carry Circuit #2 and existing Line #5519 from Line #5519 structure #629 to the Goose Lake Substation (*see* **Figure B-8** in **Appendix B**). The new structures will also consist of two deadend structures, one running angle structure, and one tangent structure – all with distribution underbuild. These structures will be approximately 90-100 feet high and will be supported by an approximately 8-foot diameter by 30-foot deep drilled pier concrete foundation.

The existing 115 kV transmission line structures in the Project area consist primarily of single davit arm, painted steel poles on concrete foundations. The existing structures also include a few lattice design structures and several wood poles with distribution underbuild located along the segment of Line #5519 adjacent to Goose Lake Substation. The average height of the existing structures is approximately 75 feet. Therefore, the new double circuit structures will be approximately 5 to 15 feet taller than the existing single circuit structures proposed to be replaced.

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 Xcel Energy standards. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.

The 115/115 kV transmission line conductors will be 795 thousand circular mils ("KCmil") 26/7 Aluminum Core Steel Supported ("ACSS") conductor, or conductor of comparable capacity.

A typical photo of the existing structures proposed to be replaced is shown in **Figure 5.** A typical photo of the primary new structure type proposed for the Project is shown below in **Figure 6.** Note that Figure 6 shows an example of a weathering steel structure type; as noted previously, the proposed structures may be weathering or galvanized steel. **Table 5** summarizes specifications for proposed structures.

FIGURE 5
PHOTO OF TYPICAL EXISTING 115 KV
SINGLE CIRCUIT STRUCTURE

FIGURE 6
PHOTO OF TYPICAL PROPOSED 115/115 KV
DOUBLE CIRCUIT VERTICAL DAVIT ARM STRUCTURE

TABLE 5
PROPOSED STRUCTURE DESIGN SUMMARY

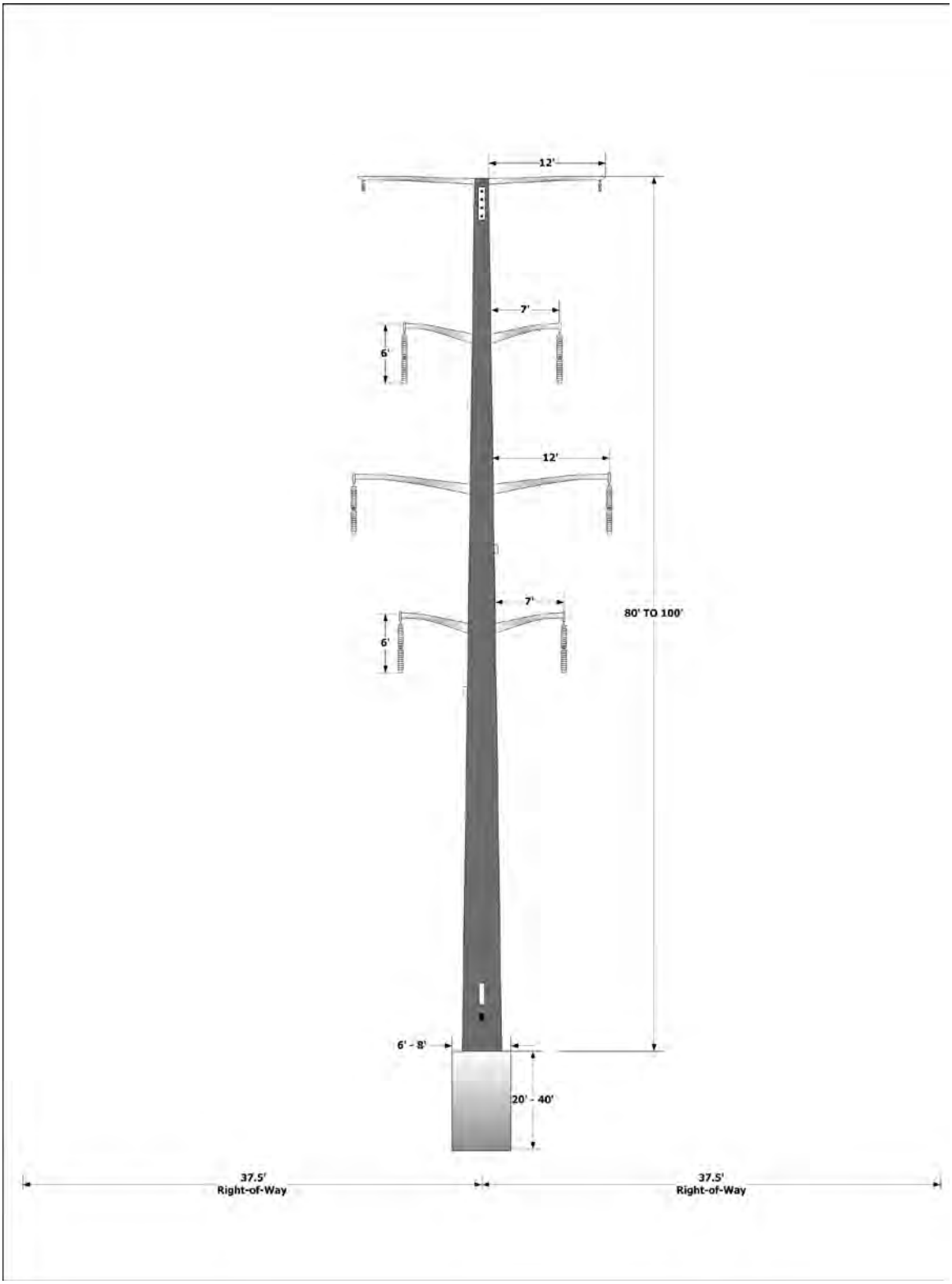
Line Type	Structure Type	Structure Material	Right-of-Way Width (feet)	Structure Height (feet)	Foundation	Foundation Diameter (feet)	Span Between Structures (feet)
115/115 kV Double Circuit	Single pole, vertical davit arm configuration	Galvanized or weathering steel	75	80-90	Drilled pier concrete foundation	6' diameter	300 to 500
115/115 kV Double Circuit	Dead-end/ angle structures	Galvanized or weathering steel	75	90-100	Drilled pier concrete foundation	7' to 8' diameter	--

5.1.2 Right-of-Way Width

Because the proposed Project involves a rebuild of an existing transmission line, Xcel Energy will design the Project to be located within the existing railroad right-of-way (which varies between either 100 or 200 feet wide depending on the location) to the maximum extent practicable.

Xcel Energy anticipates the need to acquire some new right-of-way, up to 75 feet wide, along the Proposed Route, including along the west side of Otter Lake Road (County Road 148) near the northern terminus of the Proposed Route, and along the Bruce Vento Trail near the southern terminus of the Proposed Route (*see* **Figure B-10** in **Appendix B**). **Figure 7** shows the anticipated pole dimensions and general right-of-way requirements for the Project.

FIGURE 7
TYPICAL DIMENSIONS AND RIGHT-OF-WAY REQUIREMENTS FOR PROPOSED DOUBLE CIRCUIT 115/115 KV DAVIT ARM STRUCTURES



5.1.3 Right-of-Way Evaluation and Acquisition

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. 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 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' 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, Xcel Energy is 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 Stat. § 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.

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 the right-of-way using the wire zone/border zone concept (*see* **Appendix F**). 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.

As shown on the vegetation management schematic included as **Appendix F**, Xcel Energy maintains a Hazard Tree Clearing Area on either side of the right-of-way. In addition to the rights to trim or remove vegetation from within the right-of-way, the easement language also typically provides for removal of trees outside of, and immediately adjacent to, the right-of-way, which due to their location, height, and condition (i.e., typically dead or dying trees) have the potential to contact or endanger the transmission line by falling on the line. When tree removal is necessary from within the Hazard Tree Clearing Area, Xcel Energy vegetation management personnel will notify the landowner to arrange access and scheduling whenever reasonably practicable.

The following provides a list of general practices Xcel Energy typically follows 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 accessways.
- Selectively retain some vegetation within the right-of-way where feasible for aesthetic purposes.
- 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 accessways to minimize rutting, maintain surface and subsurface water flows in the wetland, and reduce erosion and sedimentation.
- Where necessary to cross wetlands, create access through the shortest route within the wetland resulting in the least amount of physical impact to the wetland during construction.
- 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.
- Complete construction in wet organic soils when the ground is frozen to the extent practicable.

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 practicable after construction or clearing activities cease. Restoration activities may include:

- Regrading areas disturbed by construction or clearing to reflect pre-construction topography;
- Returning floodplain contours to their pre-construction profile if disturbed during construction;
- Planting or seeding non-agricultural areas disturbed by transmission line structures to prevent runoff. Use of native seed mixes from indigenous plants; ensure seeding and/or plantings are done at a time congruent with seeding and growth of the area, rather than during a time that would preclude germination or rooting; and/or

- Restoring the right-of-way, temporary work spaces, accessways, and other areas of ground disturbance affected by Project construction upon completion of work.

See Section 6.5.5 for a more detailed discussion regarding invasive species management.

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 construction and the 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 number of trees. A limited number 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 federal, state, and local approvals are obtained, property and rights-of-way are acquired, soil conditions are established, and final 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, and available workforce.

Construction will follow standard construction and mitigation practices, including best management practices ("BMPs") that were developed from experience with past projects. These 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 factors. In some cases, activities or schedules are modified to minimize impacts on sensitive environments.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope will not be graded or leveled. Sites with more than 10 percent slope will have working areas graded level or fill brought in for working pads. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities, if any. If permission is not obtained, the site is graded back to its original condition to the extent possible and imported fill is removed.

Typical construction equipment used on a Project consists of 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. Staging areas are often established for the Project. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials are stored at staging areas until they are needed for the Project.

Staging areas may also be required for additional space for storage during construction. These areas will be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The temporary staging areas outside of the transmission line right-of-way will be obtained through rental agreements.

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 necessary to accommodate the heavy equipment used in construction, including cranes, concrete trucks and hole drilling equipment, existing access roads may be upgraded or new roads may be constructed. New access roads may also be constructed

when no current access is available or the existing access is inadequate to cross roadway ditches. To the extent possible, these activities are coordinated with the owner of the property affected.

When it is time to install the poles (structures), they are generally moved from the staging areas and delivered to the staked location. The poles are typically placed within the right-of-way until the pole is set. Insulators and other hardware are attached while the pole is on the ground. The pole is then lifted, placed and secured using a crane.

The proposed double circuit structures will be constructed on drilled pier concrete foundations, which may vary from approximately 6 to 8 feet in diameter and 20-40 feet in depth, depending on soil conditions. After the concrete foundation is set, the pole is bolted to the foundation. Tangent and light angle structures will be placed on poured concrete foundations. If conditions warrant, structures may be direct embedded. Direct embedding 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.

Environmentally sensitive and wetland areas may require special construction techniques, which may vary according to conditions at the time of construction. During construction, impacts to wetland areas will be minimized to the extent possible. Additionally, construction practices that help prevent soil erosion will be utilized and measures will be taken to ensure that equipment fueling and lubricating will occur at a distance from waterways. Additional mitigative measures relating to wetlands are contained in Section 6.5.2.

5.1.6 Post-Construction 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, Xcel Energy will fairly reimburse the landowner for the damages sustained. In some cases, Xcel Energy 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 quickly and successfully 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/or
- 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.

See Section 6.5.5 for a more detailed discussion regarding invasive species management.

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 a transmission line for accounting purposes is approximately 40 years. However, practically speaking, 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 exceeds 90 percent.

The principal operating and maintenance cost for transmission facilities is the cost of inspections, usually done monthly by air. Annual operating and maintenance costs for transmission lines in Minnesota and the surrounding states vary. For transmission lines with voltages ranging from 69 kV through 345 kV, experience shows that the maintenance cost is approximately $300 to $500 per mile. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used, and the age of the line.

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

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 0.77 kV/m, far below the 8 kV/m maximum imposed by the Commission. The conductor configuration design of the proposed 115/115 kV double circuit transmission line will result in a cancellation effect on the electric and magnetic fields. Thus, EMF levels following construction of the new double circuit transmission line will decrease from the present EMF levels of the existing single circuit transmission line as shown in the tables below. The calculated electric fields for the Project are provided in **Table 6**. As shown in **Table 6**, the calculated electric fields of the proposed 115/115 kV double circuit transmission line will decrease by a minimum of 22% at 75 feet from the proposed centerline and will decrease by a maximum of 110% at 25 feet from the proposed centerline when compared to the electric field of the existing 115 kV single circuit transmission line.

TABLE 6
COMPARISON OF CALCULATED ELECTRIC FIELDS (KV/M) FOR PROPOSED 115/115 KV TRANSMISSION LINE AND EXISTING 115 KV TRANSMISSION LINE (ONE METER ABOVE GROUND)

Structure Type	Maximum Operating Voltage (kV)	Distance to Centerline (feet)														
		-300	-200	-100	-75	-50	-37.5	-25	0	25	37.5	50	75	100	200	300
Single Pole, Davit Arm, 115/115 kV Double Circuit **(Proposed)**	121/121	0.00	0.01	0.02	0.03	0.08	0.22	0.56	0.77	0.56	0.23	0.08	0.02	0.02	0.00	0.00
Single Pole, Braced Post, 115 kV Single Circuit **(Existing)**	121	0.00	0.01	0.06	0.09	0.19	0.31	0.60	1.10	0.51	0.33	0.21	0.09	0.05	0.01	0.00

5.2.2 Magnetic Fields

There are presently no Minnesota regulations pertaining to magnetic field exposure. Xcel Energy provides information to the public, interested customers and employees so they can make informed decisions about MFs.

The magnetic field profiles around the proposed transmission lines for each structure and conductor configuration being considered for the Project is shown in **Table 7**. Magnetic fields were calculated for the Project under peak and average current flows as projected for the year 2017 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 calculated magnetic fields show that field levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from source). As shown in **Table 7**, the calculated magnetic fields of the proposed 115/115 kV double circuit transmission line will decrease by a minimum of 23% at 100' feet from the proposed centerline and will decrease by a maximum of 67% at 25 feet from the proposed centerline when compared to the magnetic field of the existing 115 kV single circuit transmission line.

The magnetic field produced by the transmission line is dependent on the current flowcing on its conductors. Therefore, the actual magnetic field when the Project is placed in service is typically less than shown in **Table 7**. This is because the table represents the magnetic field with current flow at expected normal peak based on projected regional load growth through 2017, 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 7
COMPARISON OF CALCULATED MAGNETIC FLUX DENSITY (MILLIGAUSS) FOR PROPOSED 115/115 KV TRANSMISSION LINE AND EXISTING 115 KV TRANSMISSION LINE (ONE METER ABOVE GROUND)

Structure Type	System Condition	Current (Amps)	Distance to Centerline (feet)														
			-300	-200	-100	-75	-50	-37.5	-25	0	25	37.5	50	75	100	200	300
Single Pole, Davit Arm, 115/115 kV Double Circuit **(Proposed)**	Peak	523	0.40	0.58	1.73	3.52	9.28	16.50	30.26	65.79	33.86	19.43	11.52	4.82	2.50	0.68	0.42
	Average	314	0.24	0.35	1.04	2.11	5.57	9.90	18.17	39.50	20.33	11.66	6.92	2.89	1.50	0.41	0.25
Single Pole, Braced Post, 115 kV Single Circuit **(Existing)**	Peak	826	0.95	2.03	7.48	12.58	24.73	37.41	58.90	100.65	50.35	32.01	21.25	10.83	6.39	1.63	0.70
	Average	496	0.57	1.22	4.49	7.55	14.85	22.46	35.37	60.44	30.23	19.22	12.76	6.50	3.84	0.98	0.42

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 in areas where the transmission lines proposed in the Application are parallel to or cross distribution lines. Measures to reduce NEV levels by reducing the impact of EMF levels on the distribution neutrals include: cancellation, separation, and/or enhanced grounding. Examples of these three measures include: arranging transmission line phase conductors in a configuration to minimize EMF levels (cancellation), providing greater vertical distance between the transmission line phase conductor and an underbuilt distribution line (separation), and employing bare buried counterpoises connected to the distribution neutral and/or transmission shield wire (enhanced grounding). Any person with questions or concerns about stray voltage issues on their property can contact Xcel Energy for further information and site investigation.

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:

- one or more of the fence insulators can be shorted out to ground with a wire when the charger is disconnected; or
- 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 National Electrical Safety Code (NESC).

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 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 requirements establish clear zones between transmission facilities and various types of buildings and structures. 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, or the applicable NESC clearance requirements for other types of structures on their property can contact Xcel Energy for further information.

6.0 ENVIRONMENTAL INFORMATION

This section provides a description of the environmental setting, potential impacts and mitigative measures Xcel Energy proposes, where applicable, to minimize the impacts of siting, constructing and operating the Project. The majority of the mitigative 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 Project is located entirely in Ramsey County within the cities of Maplewood, White Bear Lake, Vadnais Heights, and White Bear Township. The southern terminus of the Project is the Kohlman Lake Substation located south of Highway 694, approximately 1,000 feet east of Highway 61 in the City of Maplewood (*see* **Figure B-3**). The northern terminus of the Project is the Goose Lake Substation located approximately 500 feet northwest of the intersection of White Bear Parkway and Otter Lake Road (County Road 148) in White Bear Township (*see* **Figure B-9**).

The Project traverses two areas characterized by the Minnesota Department of Natural Resources ("MnDNR") Ecological Classification System ("ECS") (MnDNR, 2012a) as the Anoka Sand Plain Subsection in the north (MnDNR, 2012b) and the St. Paul-Baldwin Plains and Moraines Subsection in the south (MnDNR, 2012c).

The Anoka Sand Plain subsection generally consists of a flat to gently rolling, sandy lake plain in the Project area. Seventy to eighty percent of the soils of the Anoka Sand Plain are excessively well drained sands and approximately 20 percent are very poorly drained. Approximately three percent of the land surface in this subsection is covered by water. The area was previously occupied by oak barrens and openings, with characteristic trees being bur oak and northern pin oak. Today, the subsection can be characterized predominantly by urban development in the immediate vicinity of the Project.

Landforms associated with the St. Paul-Baldwin Plains and Moraines Subsection are morphologically dominated by the Superior lobe end moraine complex (MnDNR, 2012c). Glacial till from moraine deposition may be found in this subsection along with associated glaciofluvial and glacial lacustrine deposits. Interrupted drainage patterns in the area reflect the glacial moraine deposition and landforms. This ecological subsection was previously dominated by oak and aspen savanna with occurrences of tallgrass prairie and maple-basswood forest.

Current United States Geological Survey ("USGS") Land use/Land cover database information characterizes the Project area as consisting of urban developed land with areas of open space and intermittent strips of deciduous forest (*see* **Figure B-12**).

6.1.1 Topography

Topography in the Project area is characterized by flat to gently rolling in the southern and northern portions where the surficial geology is predominantly glacial lacustrine and glaciofluvial in nature, and hummocky in the central region owing to the presence of moraine deposits and physiography. However, the surface topography and natural drainage ways in the Project area have been anthropogenically altered, including areas along the Proposed Route. The existing railroad corridor, which the majority of the Proposed Route adjoins, has been constructed to minimize the grade and topographic relief along the entirety of its length.

6.1.2 Geology and Soils

Geology of the Project area is characterized by surficial unconsolidated glacial drift deposits ranging from approximately 100 to over 200 feet thick (Minnesota Geological Survey, 1992a) overlying bedrock throughout the Project area. The Minnesota Geological Survey (1992b) indicates that the Project crosses three geomorphic regions—from south to north, they are: 1) St. Paul Sand Flats, 2) North Ramsey Mounds, and 3) Anoka Sand Plain. The surficial glacial materials represent deposition from the St. Croix Moraine, the Superior sublobe of ice, and subsequent deposition from the Grantsburg sublobe. The St. Paul Sand Flats geomorphic region is comprised primarily of outwash deposits produced from the melting Grantsburg sublobe. The North Ramsey Mounds region is a moraine complex of variable composition resulting from deposition of the St. Croix moraine from the Superior sublobe, and deposition of glacial materials on top from the Grantsburg sublobe. The Anoka sandplain is comprised primarily of lacustrine sands derived from Granstburg drift. The glacial drift in the Project area unconformably overlies the Ordovician St. Peter Sandstone and Prairie du Chien Formation (Minnesota Geological Survey, 1992c).

Soils throughout the area are derived primarily from the glacial and glaciofluvial deposits with some occurrences of organic rich mucks found in closed depressions. Soil maps from the U.S. Department of Agriculture (2012) indicate that well-drained loams and sandy loams derived from glacial moraine deposits are common in the Project area. Prominent examples include the Hayden fine sandy loam, the urban land-Kingsley complex, and the urban land-Zimmerman complex. Soils derived from glaciofluvial and lacustrine deposits include the well-drained Anoka loamy fine sand, found in the Anoka sand plain.

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. Construction crews and/or contract crews will also comply with

such 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 EMF 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, 1999). 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 MFs 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 causal 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).

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 MPUC, 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 MPUC 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 MPUC 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).

Mitigative Measures

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. 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.

6.2.2 Commercial, Industrial, and Residential Land Use

The Proposed Route crosses multiple municipal jurisdictions, including the cities of Maplewood, White Bear Lake, Vadnais Heights, and White Bear Township. *See* **Figure B-9** in **Appendix B**. As shown in **Table 8**, land uses within the municipalities along the Proposed Route include a mix of residential, commercial, and industrial uses. The Kohlman Lake Substation is located on land zoned by the City of Maplewood as Light Manufacturing (City of Maplewood, 2012). The Goose Lake Substation is located in White Bear Township on land that is zoned as Light Industrial (White Bear Township, 2012).

While the Power Plant Siting Act (PPSA) specifically supersedes and preempts local land use control under Minn. Stat. § 216E.10, subd. 1, local zoning plans will be accommodated as much as possible during detailed Project design. However, as the majority of the Proposed Route is located along an existing transmission line corridor within existing railroad right-of-way, conflicts with municipal-designated land uses are not anticipated.

TABLE 8
ZONING CLASSIFICATIONS WITHIN THE 200-FOOT ROUTE WIDTH ALONG THE PROPOSED ROUTE

Municipality	Zoning Classification	Area (Acres)
Maplewood	Multiple Dwelling	0.60
Maplewood	Light Manufacturing	2.18
White Bear Lake	General Business	0.30
White Bear Lake	Auto Oriented Business	0.25
White Bear Lake	Limited Industry	0.33
White Bear Lake	General Industry	2.64
White Bear Lake	Medium Density Residential	0.53
White Bear Lake	High Density Residential	0.17
White Bear Lake	Public	2.55
Vadnais Heights	Commercial	0.27
Vadnais Heights	Industrial	1.08
White Bear Township	Light Industrial	8.18

The proximity of residential and commercial occupied structures to the Proposed Route was determined through examination of aerial photographic coverage. There are 55 residences (including 2 apartment buildings and 2 townhouse complexes) and 51 commercial buildings located within 300 feet on either side of the Proposed Route centerline. Of these, four commercial buildings are located between 51 and 100 feet from the Proposed Route centerline (i.e., within the 200-foot requested route width). There are no structures located closer than 50 feet to the Proposed Route centerline. **Table 9** below and **Figures B-3 to B-8** in **Appendix B** identify businesses and residences located within 200 feet of the Proposed Route centerline.

TABLE 9
DISTANCE FROM PROPOSED ROUTE CENTERLINE

Structure	Distance from Proposed Route Centerline					
	0 to 50 feet	51 to 100 feet	101 to 150 feet	151 to 200 feet	201 to 250 feet	251 to 300 feet
Residences	0	0	14	18	8	15
Commercial	0	4	20	19	3	5

Relative to the substations, the closest residence is located approximately 320 feet southeast of the Kohlman Lake Substation (an apartment building), and 120 feet east of the Goose Lake Substation. The closest commercial businesses relative to the substations are located approximately 300 feet west-northwest of the Kohlman Lake Substation, and 42 feet north of the Goose Lake Substation. The fenced boundaries of the substations will not change as a result of the proposed Project.

Mitigative Measures

Land uses near the Project area are not expected to change as a result of the construction and operation of the proposed Project. Impacts to existing residential, commercial, and industrial development will be minimized by utilizing existing transmission corridor right-of-way to the maximum extent feasible. 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. 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.

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 will acquire new and/or modify existing rights-of-way for the transmission line sufficient to maintain necessary clearances.

Mitigative Measures

No displacement will occur as a result of the proposed Project and therefore, 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 10** 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 10
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

Sound Pressure Level (dBA)	Noise Source
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. Residential areas, churches, and similar type land use activities are included in NAC 1; commercial-type land use activities are included in NAC 2; and industrial-type land use activities are included in NAC 3.

Table 11 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 11
NOISE STANDARDS BY NOISE AREA CLASSIFICATION (dBA)

Noise Area Classification	Daytime		Nighttime	
	L_{50}	L_{10}	L_{50}	L_{10}
1: Residential-type Land Use Activities	60	65	50	55
2: Commercial-type Land Use Activities	65	70	65	70
3: Industrial-type Land Use Activities	75	80	75	80

The proximity of residential and commercial occupied structures to the Proposed Route was determined through examination of aerial photographic coverage. There are 31 residences (including two apartment buildings) and 37 commercial buildings located within 200 feet of the Proposed Route centerline. Of these, two residential and two commercial buildings are located between 50 and 100 feet from the Proposed Route. There are no structures located closer than 50 feet to the Proposed Route centerline. Noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible.

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 rebuilding an existing single circuit 115 kV transmission line to a double circuit 115/115 kV double circuit transmission line in approximately the same alignment. 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 above) measured at the edge of the 75-foot-wide right-of-way (37.5 feet from centerline) and 3.28 feet above ground level would be at 25.1 and 21.6 dBA, respectively. These findings are shown in **Table 12**. Although the calculated noise level of the proposed 115/115 kV double circuit transmission line will increase compared to noise levels of the existing 115 kV single circuit transmission line as shown in **Table 12**, noise levels will still be well below the MPCA nighttime L50 limit of 50 dBA for Noise Area Classification 1. It is very unlikely that transmission line noise will be audible at any homes or businesses along the Proposed Route.

TABLE 12
COMPARISON OF CALCULATED AUDIBLE NOISE (dBA) FOR PROPOSED 115/115 KV DOUBLE CIRCUIT TRANSMISSION LINE AND EXISTING 115 KV SINGLE CIRCUIT TRANSMISSION LINE (ONE METER ABOVE GROUND)

Structure Type	L_5 (Rain) Edge-of-ROW Decibels a weighted	L_{50} (Rain) Edge-of-ROW Decibels a weighted
Single Pole, Davit Arm, 115/115 kV Double Circuit **(Proposed)**	25.1	21.6
Single Pole, Braced Post, 115 kV Single Circuit **(Existing)**	20.9	17.4

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 structures to the Kohlman Lake Substation include an apartment building located approximately 320 feet to the southeast and a business located approximately 300 feet to the west-northwest. The nearest occupied structures to Goose Lake Substation include a residence

located approximately 120 feet to the east and a business located approximately 42 feet to the north. It is very unlikely that substation noise will be audible at these homes or businesses.

The proposed Project does not involve any changes to the existing transformers or any other modifications that would result in a change in noise levels at either the Kohlman Lake Substation or the Goose Lake Substation. Calculated audible noise (dBA) measured at thirteen various points 50 feet in any direction from the existing fenceline at the Kohlman Lake substation ranges from 42.77 dBA to 46.30 dBA.. Calculated audible noise (dBA) measured at thirteen various points 50 feet in any direction from the existing fenceline at the Goose Lake substation ranges from 36.72 dBA to 49.50 dBA. Thus, existing noise levels are below the MPCA nighttime L50 limit of 50 dBA for Noise Area Classification 1 and will not increase as a result of the proposed Project.

Mitigative Measures

No noise impacts are anticipated; therefore, no mitigative measures are proposed.

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 (1) 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 (2) 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

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

There are several existing Xcel Energy transmission lines within the viewshed of the Project area. The Proposed Route for the 115/115 kV double circuit transmission line will primarily follow the existing 115 kV single circuit transmission line route. Therefore, the Project will not result in a significant change to the visual and aesthetic character of the area, as the Project does not involve introducing an entirely new transmission line in an area where none currently exist.

Approximately 40 existing single circuit structures will be replaced with approximately the same number of double circuit structures in approximately the same alignment along the Proposed Route. The existing transmission line structures in this area are a mix of galvanized and painted steel poles, some wood poles, and a few lattice towers. The majority of the proposed new double circuit structures will be self-supported, galvanized or weathering steel poles with a vertical davit arm configuration (3 arms on each side) with an average height of approximately 90 feet and an average span of 300 to 500 feet. The existing single circuit structures have an average height of approximately 75 feet; therefore, the new structures will be on average approximately 15 feet taller, which may make the transmission line more visible in some locations. The overall spacing of the new poles will be comparable to the spacing of the existing poles, but may vary based on engineering and land use constraints (e.g., steep slopes, soil conditions, etc.). The finish of the proposed poles will be galvanized or weathering steel, which compared to the existing painted steel poles give the transmission line a somewhat cleaner and more modern appearance. The proposed structure specifications are described in detail in Section 5.1.

Like the existing 115 kV single circuit transmission line, the new 115/115 kV double circuit transmission line will be visible throughout the general area surrounding the Proposed Route. Land use within the Project area is primarily urban development (e.g., residential, commercial, and industrial) with some occurrences of forested land and open space. The visual effect will depend largely on the perceptions of the observers. The existing transmission lines and substations within the Project area will limit the extent to which the proposed double circuit rebuild Project is viewed as a disruption to the area's scenic integrity. Necessary vegetation removal and the increased height of the double circuit structures may make the proposed Project more visible in some locations along

the viewshed, while other views of the double circuit transmission line may not result in a perceptible visual change from the existing single circuit transmission line.

The proposed improvements to the Kohlman Lake and Goose Lake substations will involve changes to equipment located entirely within the existing fenced substation area. The footprint of the substations will not change or be expanded and the equipment modifications will not result in a noticeable change to the visual appearance of either substation.

Mitigative Measures

To minimize impacts to the aesthetics and visual character of the Project area, Xcel Energy has identified a Proposed Route that predominantly uses the existing transmission line corridor and railroad right-of-way and avoids residences and businesses to the greatest extent practicable. Xcel Energy will work with individual landowners as necessary to identify concerns related to the transmission line aesthetics.

6.2.7 Socioeconomic Impacts

According to 2010 U.S. Census data, Ramsey County was comprised of approximately 73 percent Caucasian and 27 percent minority populations. In the vicinity of the Proposed Route, minority groups constitute a range of 3 percent to 24.5 percent of the total population.

The per capita income of the Project location ranges between $28,847 in White Bear Township (2000) and $36,328 in Vadnais Heights (2010). Compared to the state or county average, the Project area does not comprise disproportionately high minority or low-income populations. Persons living in Ramsey County have a slightly lower median family income when compared with the rest of the state. The percentage of homes with income levels below the federal poverty line is approximately 2 percent greater than the national average, but slightly higher than the state average (U.S. Census Bureau, 2012a). Population and economic data is provided in **Table 13**.

TABLE 13
POPULATION AND ECONOMIC CHARACTERISTICS OF THE PROJECT AREA

Location	2010 Population	Minority Population (percent)	Caucasian Population (percent)	Per Capita Income (U.S. dollars)	Percentage of Population Below Poverty Level (families)
State of Minnesota [a]	5,303,925	14.7	85.3	$29,582	10.6
Ramsey County [b]	508,640	27.4	72.6	$28,956	15.8
Maplewood [c]	38,018	24.5	75.5	$29,499	10.6
White Bear Lake [d]	23,797	9.9	90.1	$31,129	6.9
Vadnais Heights [e]	12,302	5.1	84.9	$36,328	7.2
White Bear Township	10,949 [f]	3.0 [g]	97.1 [h]	$28,847 [i]	2.8 [h]

Location	2010 Population	Minority Population (percent)	Caucasian Population (percent)	Per Capita Income (U.S. dollars)	Percentage of Population Below Poverty Level (families)
[a] U.S. Census Bureau, 2012b.					
[b] U.S. Census Bureau, 2012c.					
[c] U.S. Census Bureau, 2012d.					
[d] U.S. Census Bureau, 2012e.					
[e] U.S. Census Bureau, 2012f.					
[f] U.S. Census Bureau, 2012g.					
[g] White Bear Township, Minnesota, 2012.					
[h] Wikipedia, 2012.					
[i] ePodunk, 2012b.					

Approximately 20 to 25 workers will be needed over 8 to 10 weeks to rebuild the proposed transmission line. During construction, construction crews will spend money locally, thereby providing a small economic benefit to the community.

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

The Project is not expected to create additional permanent jobs. The construction activities may provide a seasonal influx of additional dollars into the communities during the construction phase, and materials such as concrete may be purchased from local vendors.

Once the Project is operational, its socioeconomic effects are generally positive because it will provide a more reliable supply of electricity, encourage economic development, provide for future growth, and increase the 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 Project construction, increased tax revenue, and increased opportunities for business development.

Mitigative Measures

Xcel Energy does not anticipate any adverse socioeconomic impacts from the Project and therefore, no mitigative measures are proposed.

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 region surrounding the Project area has cultural values tied to the area's strong German, Irish, and Norwegian heritage (ePodunk, 2012a). Health care and social assistance comprised the largest employment sector in 2010 for the region surrounding the Project, and the area depends primarily on commerce and manufacturing (Indiana Business Research Center, 2012). Local community ties relate to work, worship, celebration, and recreation. Construction of the proposed Project is not expected to conflict with the cultural values of the area.

Mitigative Measures

No impacts to cultural values are anticipated and therefore, no mitigative measures are proposed.

6.2.9 Recreation

The Proposed Route crosses four municipalities in Ramsey County, including Maplewood, Vadnais Heights, White Bear Lake, and White Bear Township. Recreational resources near the Proposed Route include: (1) the Bruce Vento Trail - a mixed use recreational trail located adjacent to the Proposed Route for approximately 2,000 feet immediately north of the Kohlman Lake Substation, and (2) and Willow Marsh Reserve, part of the City of White Bear Lake's park system located north of Highway 694 near the southern terminus of the Proposed Route, which is bisected by the existing railroad and transmission line rights-of-way over a distance of approximately 2,000 feet. Other recreational resources that are located near the Project include McCarty and Stellmacher Parks in White Bear Lake located approximately 1,500 feet and 1,000 feet, respectively, to the east of the centerline of the Proposed Route in White Bear Lake, and a golf course in the City of Gem Lake located approximately 600 feet to the west of the centerline of the Proposed Route separated by the Burlington Northern Santa Fe Railroad (*see* **Figure B-11** in **Appendix B**).

The Project is not expected to result in permanent impacts to any of these recreational resources, as the proposed double circuit transmission line will use the existing transmission line corridor for the majority of the alignment and thus, will avoid these recreation areas. However, construction of the proposed Project may result in temporary impacts associated with access limitations, noise, aesthetics, and vegetation removal.

Xcel Energy staff met with representatives from Ramsey County Parks and Recreation in July 2012 to discuss the County's future plans for the northern extension of the Bruce Vento multi-use trail in areas adjacent to the proposed Project and the potential for coordination among the two projects. The Bruce Vento trail is an asphalt, wheelchair accessible trail used for biking, inline skating, walking, and cross country skiing. In the vicinity of the proposed Project, the trail extends from just east of the Kohlman Lake substation north to its current endpoint at Buerkle Road (*see* **Figure B-11** in **Appendix B**).

Additionally, the City of White Bear Lake expressed particular concern regarding limiting vegetation removal near the City's Willow Marsh Reserve located on either side of the Proposed Route. Xcel Energy will continue to work closely with Ramsey County, the City of White Bear Lake, and other government officials to ensure that impacts to recreational resources are minimized.

Mitigative Measures

Impacts to recreational resources will be limited to temporary impacts associated with construction activities, such as access limitations, and visual and noise impacts from the presence and operation of construction equipment. Any anticipated impacts on recreational resources will be discussed with the appropriate governing authorities to determine means of minimizing or avoiding impacts. Any physical impacts to trails or other recreational resources resulting from construction activities will be restored to pre-construction conditions.

6.2.10 Public Services and Transportation

Public services in the Project area include sewer and water services and existing and future transportation corridors and projects. The City of White Bear Lake provides its own potable water supply from four deep wells. The cities of White Bear Lake and Vadnais Heights, and White Bear Township provide water to their residents from their own municipal wells, while the City of Maplewood distributes the majority of its water received from St. Paul Regional Water Services and lesser amounts from adjoining municipalities. The cities of Maplewood, White Bear Lake, and Vadnais Heights and White Bear Township discharge their sanitary sewer systems to the Metropolitan Council Environmental Services treatment plant. The Project is not expected to directly impact public services to area residents.

The Proposed Route crosses two state roadways, including Interstate 694 and Highway 61. Xcel Energy will work with the Minnesota Department of Transportation (MnDOT) to obtain any necessary permits to allow utility crossings of these roadways (e.g., MnDOT Long Form TP-2525). Additionally, the Proposed Route crosses three County roadways, including County Road E, County Road F, and County Road 146. Xcel Energy will work with Ramsey County to obtain any necessary County road crossing permits. Because the proposed Project involves a rebuild of an existing transmission line, these road crossings will occur in approximately the same alignment as the existing transmission line crossings (*see* **Figures B-3** through **B-8** in **Appendix B**).

In a meeting between Xcel Energy staff and City of Maplewood engineering staff, the City discussed proposed plans for future road improvements involving connecting County Road D Court to Hazelwood Street directly north of the Kohlman Lake Substation (*see* **Appendix G**). Xcel Energy will work with the City of Maplewood to ensure the final design and pole placement will not interfere with the City's road improvement plans.

Mitigative Measures

The proposed Project will not directly impact public services; therefore, no mitigative measures are proposed. Xcel Energy will coordinate with Ramsey County, the City of Maplewood, and other municipalities as necessary to coordinate structure placement relative to anticipated transportation improvement plans. Additionally, the final Project design and structure placement will be conducted in accordance with MnDOT policies and permits as applicable.

6.3 LAND-BASED ECONOMICS

6.3.1 Agriculture

As indicated in **Figure B-12** in **Appendix B**, the proposed Project will be located within urban and suburban developed areas and will not cross any land used for agricultural purposes.

Mitigative Measures

No agricultural land will be impacted by the proposed Project; therefore, no mitigative measures are proposed.

6.3.2 Forestry

There are no federal, state, or locally designated forests, forest production, or commercial logging operations located within the Project area. The majority of the Project is located within railroad right-of-way that traverses through developed areas comprised of residential, commercial, and industrial land uses.

Urbanization has altered the natural vegetation in the Project area, which was historically dominated by oak and aspen savanna with some tallgrass prairie and maple-basswood forest, all of which have been greatly reduced as a result of modern development. Currently, the majority of trees present within the vicinity of the Proposed Route are associated with residential and commercial landscaping, and occasional small wooded uplands.

Mitigative Measures

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

6.3.3 Tourism

The proposed Project is located in a developed urban and suburban area where tourism opportunities are limited to recreational resources in the area. As discussed in Section 6.2.9, the main recreational resources in the vicinity of the Project include the Bruce Vento Trail, Willow Marsh Reserve, McCarty and Stellmacher Parks in White Bear Lake, and a golf course located approximately 600 feet to the west of the Proposed Route in the City of Gem Lake.

Mitigative Measures

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

6.3.4 Mining

No gravel pits, rock quarries, or commercial aggregate sources were found within the Project area on USGS topographic maps or during a site visit. Moreover, since the proposed Project involves rebuilding a transmission line in an existing transmission corridor, no mineral or aggregate resources will be affected. Because no existing gravel, rock, and aggregate resources are being utilized within the Project area, no impacts are anticipated.

Mitigative Measures

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

6.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES

On behalf of Xcel Energy, Merjent, Inc. conducted a Phase Ia background research/literature review in January and February 2012 for the Project area within 0.5-mile of the centerline of the Proposed Route as indicated in **Figure B-13** in **Appendix B** (*see* **Appendix H**). Merjent visited the Minnesota State Historic Preservation Office ("SHPO"), and examined the Minnesota Archaeological Site Files, the Minnesota Architectural History Site Files, and cultural resources investigation reports on file. Merjent also requested a database file search from the SHPO, which was delivered by email. Online resources were used to view primary sources such as original land survey maps, patent records, and historic aerial photographs.

The background research and literature review found no cultural resource sites within 0.5 miles of the Proposed Route, including archaeological sites, unverified archaeological site lead, standing structures, or properties listed or eligible for listing on the National Register of Historic Places ("NRHP"). The potential to impact any undiscovered archaeological site is low to very low because the proposed Project will be located along existing transportation and utility corridors in an area already disturbed by residential, commercial, and industrial development.

In a letter dated April 6, 2012, the Minnesota SHPO commented on the proposed Project and Phase Ia literature review report (*see* **Appendix C.6**). The Minnesota SHPO concluded that there are no properties listed on the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by the Project.

Mitigative Measures

No impacts to archaeological and historic resources are anticipated as a result of the proposed Project. If there is an unanticipated discovery of cultural resources during Project construction, Xcel

Energy will stop construction activities and consult with a professional archaeologist and Minnesota SHPO to determine the proper course of action. If a cultural item or feature is determined to be potentially eligible for listing on the NRHP, it will be avoided or mitigated before construction resumes.

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 transmission 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. With the implementation of BMPs, Xcel Energy anticipates minimal impacts to air quality. Therefore, no other mitigative measures are proposed.

6.5.2 Water Quality

Floodplains

Floodplain resources were identified for the Project using Federal Emergency Management Agency ("FEMA") maps. As shown on **Figure B-16** in **Appendix** B, portions of the Proposed Route width and portions of the existing Kohlman Lake and Goose Lake substations are located in FEMA-designated 100-year floodplain.

The MnDNR is the state agency with overall responsibility for implementation of the State Flood Plain Management Act. The MnDNR has established minimum standards for floodplain management entitled "Statewide Standards and Criteria for Management of Flood Plain Areas of Minnesota" (Minn. R. 6120.5000 to 6120.6200). These standards have two direct applications: 1) all local floodplain regulations adopted after June 30, 1970 must be compliant with these standards; and 2) all state agencies and local units of government must comply with Minnesota Regulations in the construction of structures, roads, bridges or other facilities located within floodplain areas delineated by local ordinance. Local floodplain regulatory programs, administered by county government, predominately for the unincorporated areas of a county, and by municipal government for the incorporated areas of a county, must be compliant with federal and state floodplain management standards. Both federal and state standards identify the 100-year floodplain as the minimum area necessary for regulation at the local level. These regulations are intended to protect new development and modifications to existing development from flood damages when locating in a flood prone area cannot be avoided (MnDNR, 2011d).

Mitigative Measures

The Xcel Energy does not anticipate that the Project will result in a negative impact on flood levels because the Project will not introduce a greater number of structures than currently exists, nor will the Project result in significant alterations to the existing topography of the Project area. Xcel Energy will work with the MnDNR and/or Ramsey County to address floodplain questions or concerns associated with the proposed Project.

Wetlands and Waterbodies

Wetland locations were identified using the U.S. Fish and Wildlife Service ("USFWS") National Wetland Inventory ("NWI") maps. Note that the NWI has not been field verified and sometimes contains inaccuracies; however, NWI is a tool for initial wetland identification and assessment.

In total, approximately 11.8 acres of freshwater emergent wetlands are located within the 200-foot-wide Proposed Route width based on NWI mapping. **Figure B-15** in **Appendix B** shows wetland locations and **Table 14** summarizes the wetlands located within the 200-foot-wide Proposed Route width.

TABLE 14
WETLANDS WITHIN THE 200-FOOT WIDE PROPOSED ROUTE WIDTH

Township	Range	Section	Wetland Type [a]	Wetland Description	Wetland Area (acres)
T30N	R22W	22	PEMC	Freshwater Emergent Wetland	1.23
T30N	R22W	27	PEMC	Freshwater Emergent Wetland	1.49
T30N	R22W	27	PEMC	Freshwater Emergent Wetland	1.23
T30N	R22W	34	PEMC	Freshwater Emergent Wetland	7.89
				Total	11.84

[a] Based on the USFWS' Cowardin Classification System for wetlands (Cowardin and others, 1979).

The wetlands present within the 200-foot-wide Proposed Route width likely constitute jurisdictional wetlands by the U.S. Army Corps of Engineers ("USACE") under Section 404 of the Clean Water Act. It is anticipated that final Project design efforts will incorporate spacing of structures such that the wetlands are spanned and no permanent wetland fill will occur.

The MnDNR Public Waters Inventory ("PWI") identifies lakes, wetlands, and watercourses over which the MnDNR has regulatory jurisdiction. **Figure B-14** in **Appendix B** shows Public Waters located within the Proposed Route width and the surrounding area. Minnesota law (Minnesota Statutes Section 84.415 administered through Minnesota Rules Chapter 6135) requires that a license be obtained from the MnDNR Division of Lands & Minerals for the passage of any utility over,

under, or across any state land or public waters. Xcel Energy will work with the MnDNR to obtain the necessary licenses if the proposed Project crosses PWI wetlands or waters. (MnDNR, 2012d).

Other water resources located in close proximity to the Proposed Route that have the greatest potential to be impacted are an unnamed ditch that drains into Phalen Creek, Willow Marsh, and Goose Lake. Temporary impacts on water quality may result from ground disturbance (e.g., excavating, grading, construction traffic, etc.) and are limited to the construction phase of the Project when sediment could potentially reach surface waters.

Mitigative Measures

Permanent impacts on public waters and wetlands will be avoided wherever feasible by maximizing the typical span length over these areas. In addition, crossing wetlands with equipment will be avoided except where necessary. Where wetlands must be crossed to pull in the new conductors and shield wires, workers may walk or drive equipment across ice in the winter. These construction practices will help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from wetlands.

Xcel Energy will apply erosion control measures identified in the MPCA Stormwater Best Management Practices Manual, such as the use of silt fencing, 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.

As described above, Minnesota Statutes requires 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. Xcel Energy will either confirm the applicability of existing licenses for any such crossings, or obtain new utility crossing licenses prior to construction, as necessary.

The MPCA regulates construction activities that may impact storm water under the Clean Water Act. A National Pollutant Discharge Elimination System ("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. A National Pollutant Discharge Elimination System ("NPDES") general stormwater permit will be applied for and obtained, since the construction activities will disturb greater than one acre of land. In addition, standard erosion control measures identified in the MPCA Stormwater BMP Manual and prescribed specifically for the Project in a Stormwater Pollution Prevention Plan ("SWPPP") will be followed.

6.5.3 Flora

The majority of the land adjacent to the Proposed Route is developed with urban and suburban land uses, including residential, commercial, and industrial development (*see* **Figures B-12** in **Appendix B**). Minor land uses adjacent to the Proposed Route include open herbaceous land and forested land consisting primarily of deciduous forest types (e.g., maple and oak). No special status plant species have been identified within the Project area.

The majority of trees within the Project area are located along either side of the railroad corridor, or are associated with streams and residential and commercial landscaping, or with occasional small wooded uplands. Impacts to trees and woodlands will be minimized because the transmission line rebuild will follow existing rights-of-way for the majority of the Proposed Route in areas that have been historically cleared and maintained for the safety and operation of the existing transmission line. Additional vegetation will need to be cleared for construction access and for any necessary right-of-way expansion.

Mitigative Measures

To minimize impacts on trees and flora along the Proposed Route, Xcel Energy will limit tree clearing and vegetation removal to the transmission line right-of-way, areas necessary for construction access, and areas that impact the safe operation of the facilities. See Section 5.1.4 for a detailed discussion on typical vegetation management and as shown on the schematic included in **Appendix F**.

6.5.4 Fauna

The Project vicinity is comprised of predominately commercial, industrial, and residential land uses. Wildlife within the vicinity of the Proposed Route consists primarily of deer, small mammals, waterfowl, raptors, and perching birds (MnDNR, 2010e). These species are typically observed in areas that are primarily open and urban, with limited opportunities for nesting and cover.

Wildlife that resides within the Proposed Route may 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 the proposed Project because no work will occur within habitat areas that support these species.

The rebuilt transmission line has the potential to 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's design standards for transmission lines provide adequate spacing to minimize the risk of raptor electrocution.

Mitigative Measures

Avian Species

Xcel Energy has been working with various state and federal agencies for over 20 years to address avian issues. 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
- Attempting to avoid areas known as primary migration corridors or migratory resting areas.

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 Swan Flight Diverters ("SFDs"), which are pre-formed spiral shaped devices made of polyvinyl chloride that are wrapped around the shield wire. The Proposed Route has been assessed for areas with potential avian issues and no areas have been identified where installation of SFDs might be warranted, as there is no significant migratory bird habitat along the Proposed Route. However, Xcel Energy will work closely with the MnDNR and USFWS regarding whether bird flight diverters are necessary once the line design is complete.

Other Wildlife Species

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

Mitigation measures specific to those species identified by the MnDNR as threatened or species of concern are also discussed in Section 6.6.

6.5.5 Invasive Species Management

Xcel Energy recognizes the need to construct the Project in a manner that minimizes the potential introduction, establishment, or spread of both terrestrial and aquatic invasive species and noxious weeds. The movement of construction equipment to, from, and between various project work sites has the potential to introduce and/or spread invasive species. Such species include, reed canary grass, common buckthorn, purple loosestrife, and leafy spurge. Invasive aquatic species, such as Eurasian water-milfoil, flowering rush and zebra mussels, are not expected to be an issue, as there are no significant waterbodies located along the Proposed Route.

Mitigative Measures

To minimize the potential for the introduction or spread of invasive species, Xcel Energy proposes to follow a basic set of best management practices during Project construction, including the following:

- All disturbed areas will be re-vegetated using weed-free, state seed mixes compiled by the Minnesota Board of Water and Soil Resources. Native plant species will be used wherever possible to re-vegetate disturbed areas. Weed-free straw or hay will be used for mulching and erosion control;
- Herbicidal and/or manual vegetation removal may be implemented where necessary to minimize the spread of invasive species where such removal is consistent with specific easement conditions and/or landowner restrictions;
- Prior to arriving at and leaving from construction sites, all construction vehicles and equipment will be cleaned and inspected to remove dirt, mud, plants, and debris from vehicles and equipment to prevent the introduction and spread of invasive species; and
- An Environmental Compliance Monitor will be present on-site periodically to ensure construction crews adhere to proper vehicle and equipment cleaning practices and other construction best management practices.

6.6 RARE AND UNIQUE NATURAL RESOURCES

A request for a Natural Heritage Information System ("NHIS") database search and comments regarding rare species and natural communities for the proposed Project was submitted to the MnDNR on February 24, 2012. The results of the MnDNR Natural Heritage Database Search are included in **Appendix C.5**. The following assessment is based on MnDNR response, a review of the Natural Heritage Database licensed to Merjent, Inc. by the MnDNR, and other state and federal rare species and natural community information.

The response letter from the MnDNR dated March 13, 2012 indicates that, based on a query of the NHIS, one rare species is known to occur within an approximate one-mile radius of the proposed Project; the Blanding's turtle (*Emydoidea blandingii*), a state-listed threatened species. In its response letter, the MnDNR included a summary of recommendations for avoiding and minimizing impacts to Blanding's turtle populations, including recommendations regarding installation of silt fencing and vegetation management (see **Appendix C.5**).

The MnDNR NHIS database was queried to obtain the locations of rare and unique natural resources across the Project location. Queries to the NHIS database often display species that either do not have a status or are of special concern (referred to as "SPC" in the tables below). Species or communities that do not have a status, or are classified as special concern, have no legal protection in Minnesota. Only potential impacts on non-aquatic species with legal protection (threatened and endangered) are discussed below.

Mitigative Measures

The Project and construction process will be designed and implemented consistent with recommendations set forth by the MnDNR to avoid encroachment and effects on rare species and unique natural resources, including the Blanding's turtle, 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 avoid or minimize impacts.

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 for applicable comments and concerns (*see* **Appendix C**). Xcel Energy also sent letters to local governmental units ("LGUs") within the general vicinity of the Project giving LGUs notice of the Project, requesting comments, and allowing LGUs the opportunity to request a meeting to discuss the Project (*see* **Appendix C.3**).

7.1.1 Notice to Local Government Units

Xcel Energy sent a Project notification letter to the LGUs identified in **Appendix C.2** on February 24, 2012. This notification letter informed LGUs that Xcel Energy intended to apply for a Route Permit for the Project from the MPUC and provided an opportunity for LGUs to request a meeting with Xcel Energy to discuss the Project as required by Minn. Stat. § 216E.03, subd. 3a.

Xcel Energy met with representatives from the cities of White Bear Lake, Gem Lake, Maplewood, and White Bear Township at their request to introduce the Project. The city representatives were generally in support of the need for the Project and requested to be updated as the Project develops and as the permitting process proceeds.

One comment letter was received from among the LGUs that were notified of the proposed Project. In a letter dated February 28, 2012, the City of White Bear Lake requested details regarding the height and appearance of the new structures compared to the existing structures, the appearance of the of the double circuit transmission line, safety concerns, and the construction schedule and construction-related impacts (*see* **Appendix C.8**). Xcel Energy discussed the City's concerns surrounding these issues during a meeting held on March 22, 2012 with White Bear Lake city officials. Xcel Energy will continue to coordinate closely with the City of White Bear Lake and other LGUs regarding the proposed Project.

7.1.2 United States Fish and Wildlife Service

On February 24, 2012 Xcel Energy submitted a consultation letter to the USFWS requesting review and concurrence that the Project will not adversely affect federally listed species and critical habitat that may be present within Ramsey County. The USFWS has not commented on the Project to date. However, Xcel Energy will continue to coordinate with the USFWS as necessary regarding federally listed species and critical habitat.

7.1.3 Minnesota Department of Natural Resources

Xcel Energy sent a letter to the MnDNR Natural Heritage and Nongame Research Program on February 24, 2012 requesting a review of the Minnesota NHIS to determine if rare plants, animals, and natural communities or other significant natural features are known to occur within an approximate one-mile radius of the proposed Project (*see* also Section 6.6 above). In the MnDNR's response dated March 13, 2012, the MnDNR indicated that the Blanding's turtle, a state-listed threatened species, may be adversely affected by the proposed Project. The MnDNR included a species fact sheet and a list of recommendations for avoiding and minimizing impacts to the Blanding's turtle. Xcel Energy will implement recommended avoidance and impact minimization measures provided by the MnDNR and will continue to coordinate with the MnDNR as necessary. See **Appendix C.5** for MnDNR comments.

7.1.4 Minnesota State Historic Preservation Office

On March 5, 2012, Xcel Energy submitted a consultation letter to the Minnesota SHPO requesting SHPO's written agreement with Phase Ia literature review report findings for the Project, which recommended that no archaeological or historic resources will be affected by construction or operation of the transmission line Project.

As discussed in Section 6.4, the Minnesota SHPO commented on the proposed Project and Phase Ia literature review report in a letter dated April 6, 2012. The Minnesota SHPO concurred that there are no properties listed on the National or State Registers of Historic Places, and no known or suspected archaeological properties are in the area that will be affected by the Project. See **Appendix C.6** for SHPO comments.

7.2 IDENTIFICATION OF LANDOWNERS

A list of the landowners within and adjacent to the Proposed Route is included in **Appendix D.1**. Addresses have been redacted from the landowner list and comment forms due to privacy concerns.

7.3 PUBLIC PARTICIPATION

Xcel Energy held a public informational meeting at the Best Western White Bear Country Inn, Vadnais Conference Room in White Bear Lake, Minnesota on June 6, 2012 prior to developing this Application. This meeting was held to inform landowners and public officials of the proposed Project and solicit comments. A notice for the public informational meeting was published in the North St. Paul Review and the White Bear Press on May 23, 2012. A copy of the newspaper notice is included in **Appendix D.2**.

Three people attended the informational meeting. A copy of the attendance form is included in **Appendix D.3**. Generally, public interest focused primarily on the design, height, and location of the proposed new double circuit structures and potential construction related impacts to private properties. Two written public comments were received regarding the proposed Project. Ms. Janet Franz stated opposition to the increased height of the steel poles near her property along Otter Lake Road and suggested just adding vertical davit arms to the existing structures to keep the poles behind the existing tree line and out of sight from her property. A copy of Ms. Franz's submitted comment form is included in **Appendix D.5**.

Additionally, Xcel Energy received a comment from Mr. Dan Marier. Mr. Marier requested an explanation as to why the new structures would be taller than the existing structures and stated that the added height and twice as many lines would make the transmission line more visible to neighboring properties. Additionally, Mr. Marier stated that he does not want the pole locations to differ from where they are presently located. Lastly, Mr. Marier expressed concern that without careful planning, the proposed Project has the potential to result in negative impacts to neighboring properties. A copy of Mr. Marier's comment letter is included in **Appendix D.5**.

Xcel Energy has acknowledged these public comments and will continue to work with the public throughout the permitting process.

7.4 REQUIRED PERMITS AND APPROVALS

Federal, state, and local permits that could potentially be required for the Project are identified in **Table 15** and discussed below.

TABLE 15
POTENTIAL REQUIRED PERMITS

Federal Permits	Jurisdiction
Clean Water Act, Section 404 Permit	USACE
State Permits	**Jurisdiction**
Route Permit (Required)	MPUC
License to Cross Public Waters	MnDNR Divison of Land and Minerals
Utility Crossing Permit	MnDOT
Construction Stormwater Permit	MPCA
Local Permits	**Jurisdiction**
County Road Permit	Ramsey County

7.4.1 Federal Permits

U.S. Army Corps of Engineers

The USACE administers the regulatory programs of the federal Clean Water 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. Xcel Energy will obtain a Route Permit as required.

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 by the Commission. The 115/115 kV double circuit transmission line proposed for the Project is a "large energy facility" because it has a capacity in excess of 100 kV; however, the Project is less than 10 miles long and does not cross state boundaries. Therefore, a Certificate of Need is not required.

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 will work closely with the MnDNR and will obtain a permit as necessary once the final line design is complete.

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 work with MnDOT to determine whether such permit is required and, if so, will obtain the necessary permit from MnDOT.

Minnesota Pollution Control Agency

MPCA requires an NPDES construction storm water permit and 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 work with the MPCA to determine if such a permit is required and, if so, will obtain the necessary permit from the MPCA.

7.4.3 Local Permits

Once the MPUC issues a route permit, all zoning, building and land use rules, regulations, and ordinances promulgated by regional, county, local governments are preempted under Minnesota Statutes Section 216E.10, subd. 1.

Ramsey County

Ramsey County may require a county road access permit.

8.0 REFERENCES

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9.0 DEFINITIONS

Alignment	A potential centerline within a route, but not necessarily the physical center of a route, along which transmission structures could be located.
Anticipated Alignment	Applicant's expected location of the transmission line based on initial project analysis.
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.
Centerline	The location of the transmission line as measured from the center of the supporting transmission structures.
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.
Distribution Underbuild	The construction of a transmission circuit (conductors) and a distribution circuit (usually at a lower voltage) on the same structures.
Double circuit	The construction of two separate circuits at the same or different voltage on the same structures to increase capacity of the line.
Easement	A permanent right authorizing a person or party to use the land or property of another for a particular purpose. In the case of this Project, this means acquiring certain rights to build and maintain a transmission line. Landowners are paid a fair price for the easement and can continue to use the land for most purposes, although some restrictions are included in the agreement.
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	The combination of an electric (E) field and a magnetic (H) field.
Electromotive Force ("EMF")	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.
Neutral to Earth Voltage ("NEV")	The term NEV is used to describe a measurable level of voltage which may occur between a metal object and the adjacent floor or earth.
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.
Proposed Route	A transmission line route proposed by the Applicant that encompasses an area 200 feet in width (i.e., Route Width) along the length between the Project's geographic endpoints. These endpoints include: the Kohlman Lake Substation (located south of Highway 694, approximately 1,000 feet east of Highway 61 in the City of Maplewood) and the Goose Lake Substation (located approximately 500 feet northwest of the intersection of White Bear Parkway and Otter Lake Road (County Road 148) in White Bear Township). See Figure 1 in Section 1.1.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Right-of-Way	The physical land area within the approved Route Width over which land rights are actually required to safely construct, operate, and maintain a transmission line.
Route Width	The area in which the utility is allowed by the Public Utilities Commission to locate the necessary Right-of-Way and complete final design of the transmission facilities.
Sediment	Material deposited by water, wind, or glaciers.
Span	The distance between two supporting structures.

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.
Ultraviolet Radiation	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
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.

10.0 ACRONYMS

ACSS	Aluminum Core Steel Support
BMPs	Best Management Practices
Company	Northern States Power Company
CR	County Road
CRP	Conservation Reserve Program
dBA	decibels
ELF	extremely low frequency
EMF	electromagnetic fields
FEMA	Federal Emergency Management Agency
GP	General Permit
HVTL	high voltage transmission line
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronic Engineers
kV	kilovolt
kV/m	kilovolts per meter
L	Level Descriptors
L_{10}	the dBA that may be exceeded 10 percent of the time within an hour
L_{50}	the dBA that may be exceeded 50 percent of the time within an hour
LEF	large energy facility
LGU	local government units
LOP	Letter of Permission
mG	milliGauss
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MPUC or Commission	Minnesota Public Utilities Commission
NAC	Noise Area Classification
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NEV	Neutral to Earth Voltage
NHIS	Nature Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OPGW	optical ground wire
PEM	Palustrine Emergent wetland

PFO	Palustrine Forested Broad-leaved Deciduous wetland
ppm	parts per million
PPSA	Power Plant Siting Act
PSCW	Public Service Commission of Wisconsin
PSS	Palustrine Shrub-Scrub Broad-leaved Deciduous wetland
PWI	public waters inventory
ROW	Right-of-way
SHPO	State Historic Preservation Office
SWCD	Soil and Water Conservation District
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WHO	World Health Organization