CHISAGO COUNTY TO APPLE RIVER TRANSMISSION LINE ROUTE PERMIT APPLICATION

ALTERNATIVE PERMITTING PROCESS

UPGRADE OF AN EXISTING 69 KV TRANSMISSION LINE TO A 115 KV/161 KV TRANSMISSION LINE

(PUC DOCKET NO.: E002, ET3/TL-06-1677)

JANUARY 5, 2007

Xcel Energy℠

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List of Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
ACSS	Aluminum Conductor Steel Supported
BMP	best management practice
BPA	Bonneville Power Administration
CBD	Central Business District
COE	Corps of Engineers
Commission	Minnesota Public Utilities Commission
CON	Certificate of Need
CPCN	Certificate of Public Convenience and Necessity
CSAH	County State Aid Highway
d/b/a	doing business as
DLM	Division of Land and Minerals
DNR	Department of Natural Resources
EA	Environmental Assessment
EMF	electromagnetic field
EPA	United States Environmental Protection Agency
EQB	Environmental Quality Board
G	Gauss
G&T	Generation and Transmission Cooperative
HDR	HDR Engineering, Inc.
HVTL	high voltage transmission line
Hz	Hertz
kV	kilovolt
kV/M	Kilovolt per meter
MCBS	Minnesota County Biological Survey
MDH	Minnesota Department of Health
mg/L	milligrams per liter – equivalent to parts per million (ppm)
MnDNR	Minnesota Department of Natural Resources
Mn/DOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
NAC	noise area classification
NERC	North American Electric Reliability Council
NESC	National Electrical Safety Code
NEV	Neutral-to-Earth Voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NSPM	Northern States Power Company Minnesota
NSPW	Northern States Power Company Wisconsin
NWI	National Wetland Inventory

ppm	parts per million
PUC	Public Utilities Commission
PWI	Public Waters Inventory
ROW	Right-of-Way
SFD	Swan Flight Diverter
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
TLE	Temporary Limited Easement
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WPA	Waterfowl Production Area
WMA	Wildlife Management Area
WPSC	Wisconsin Public Service Commission
WSR	Wild and Scenic River

1.0 EXECUTIVE SUMMARY

Northern States Power Company a Minnesota Corporation (NSPM), Northern States Power Company, a Wisconsin Corporation (NSPW), both d/b/a Xcel Energy (Xcel Energy) and Dairyland Power Cooperative (Dairyland), submit this application for a Route Permit from the Minnesota Public Utilities Commission (Commission) pursuant to Minnesota Rules Chapter 4400 and Minnesota Statutes Chapter 216B. A Route Permit is requested for the Chisago County Transmission Line Project (Project) which includes:

- Replacing the existing 69 kV transmission line located between the Xcel Energy Chisago County substation and the proposed Lawrence Creek Substation near Taylors Falls, Minnesota with a new 115 kV transmission line,
- Replacing the existing 69 kV transmission line located between the proposed Lawrence Creek Substation and the St. Croix River crossing in Taylors Falls (including a portion proposed to be buried) with a new 161 kV transmission line, and
- Modifying the existing Chisago County, Lindstrom, and Shafer substations and constructing a new Lawrence Creek Substation.

Once in Wisconsin, the line will continue to Dairyland's Apple River Substation near Amery, Wisconsin. The upgrade will enhance the current reliability of the area transmission system, as well as accommodate projected increases in energy demand to the east central area of Minnesota, and to the northern, northwestern and western areas of Wisconsin.

1.1 ELIGIBILITY FOR THE ALTERNATIVE PERMITTING PROCESS

Minnesota Rules provide for an Alternative Permitting Process for certain facilities (Minnesota Rule 4400.2000, Subpart 1(A)-(G)). The Chisago County to Apple River high voltage transmission line (HVTL) qualifies for the Alternative Permitting Process because it meets Minnesota Rule 4400.2000, Subpart 1(C), which authorizes the Alternative Permitting Process when the HVTL sought to be routed is between 100 and 200 kilovolts. The submittal requirements, as required in Minnesota Rule 4400.2000, are listed in Table 1-1, with cross-references indicating where information can be found in this application.

Table 1-1
Completeness Checklist

Authority	Required Information	Where
4400.1150, Subp. 2 Required per 4400.2100	**Site Permit for LEPGP** A. a statement of proposed ownership of the facility at the time of filing the application and after commercial operation	2.1
	B. the precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer	2.2

Table 1-1 Completeness Checklist		
Authority	**Required Information**	**Where**
	of the permit is contemplated	
	C. at least two proposed routes for the proposed high voltage transmission line and identification of the applicant's preferred route and the reasons for the preference	Not applicable, per 4400.2100
	D. a description of the proposed high voltage transmission line and all associated facilities including the size and type of the high voltage transmission line	2.5, 3.2, 3.5
	E. the environmental information required under 4400.1150, Subp. 3	See 4400.1150, Subp. 3 (A)-(H) Below
	F. identification of land uses and environmental conditions along the proposed routes	4.1; 4.2.2
	G. the names of each owner whose property is within any of the proposed routes for the high voltage transmission line	5.2.2; Appendix J
	H. United States Geological Survey topographical maps or other maps acceptable to the chair showing the entire length of the high voltage transmission line on all proposed routes	Appendix C
	I. identification of existing utility and public right-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed line	3.2.3
	J. the engineering and operational design concepts for the proposed high voltage transmission line, including information on the electric and magnetic fields of the transmission line	3.2; 3.6
	K. cost analysis of each route, including the costs of constructing, operating and maintaining the high voltage transmission line that are dependent on design and route	2.7
	L. a description of possible design options to accommodate expansion of the high voltage transmission line in the future	3.2.2
	M. the procedures and practices proposed for the acquisition and restoration of the right-of-way, construction, and maintenance of the high voltage transmission line	3.3, 3.5.5
	N. a listing and brief description of federal, state and local permits that may be required for the proposed high voltage transmission line	5.3
	O. a copy of the Certificate of Need or the certified HVTL list containing the proposed high voltage transmission line or documentation that an application for a Certificate of Need has been submitted or is not required	Appendix B
4400.1150, Subp. 3	**Environmental Information** A. a description of the environmental setting for each site or route	4.1
	B. a description of the effects of construction and operation of the facility on human settlement, including, but not	4.2

Table 1-1 Completeness Checklist		
Authority	**Required Information**	**Where**
	limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation and public services	
	C. a description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism and mining	4.3
	D. a description of the effects of the facility on archaeological and historic resources	4.4
	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	4.5
	F. a description of the effects of the facility on rare and unique natural resources	4.6
	G. identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route	All of Section 4.0 in "Impacts"
	H. a description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigative measures	All of Section 4.0 in "Mitigative Measures"
4400.1350, Subp. 2 (Applicable to Alternative Permitting Process Per 4400.2300)	**Notice of Project** Subpart 2. Mail notification to persons on general list, to local officials, and to property owners	Will be mailed within 15 days of application submission
4400.1350, Subp. 3 (Applicable to Alternative Permitting Process Per 4400.2300)	**Publication of Notice** Subpart 3. publish notice in legal newspaper of general circulation in each county in which proposed route is located that an application has been summitted and a description of the proposed project.	Will be published within 15 days of application submission
4400.2000, Subp. 1(C) and Subp. 2.	Subpart 1. **Eligible Projects**. An applicant for a site permit or a route permit, for one of the following projects, may elect to follow the procedures of parts 4400.2000 to 4400.2950 instead of the full permitting procedures in parts 4400.1025 to 4400.1900: high voltage transmission lines of between 100 and 200 kilovolts	1.1
	Subpart 2. **Notice to Commission**. An applicant for a permit for one of the qualifying projects in subpart 1, who intends to follow the procedures of parts 4400.2000 to 4400.2750, shall notify the EQB of such intent, in writing, at least ten days before submitting an application for the Project	Appendix A
4400.2100	**Contents of Application** (alternative permitting process) The applicant shall include in the application the same,	3.4; See also 4400.1150,

Table 1-1 Completeness Checklist		
Authority	**Required Information**	**Where**
	information required in part 4400.1150, 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	Subp.2 above
4400.3150	**Factors Considered** A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services	6.0 A
	B. effects on public health and safety	6.0 B
	C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining	6.0 C
	D. effects on archaeological and historic resources	6.0 D
	E. effects on the natural environment, including effects on air and water quality resources and flora and fauna	6.0 E
	F. effects on rare and unique natural resources	6.0 F
	G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity	6.0 G
	H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries	6.0 H
	I. use of existing large electric power generating plant sites	6.0 I (not applicable)
	J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way	6.0 J
	K. electrical system reliability	6.0 K
	L. costs of constructing, operating, and maintaining the facility which are dependent on design and route	6.0 L
	M. adverse human and natural environmental effects which cannot be avoided	6.0 M
	N. irreversible and irretrievable commitments of resources	6.0 N
4400.3350, Subps. 1 and 2	Subpart 1. **Wilderness areas**. No high voltage transmission line may be routed through state or national wilderness areas Subpart 2. **Parks and natural areas**. No high voltage transmission line may be routed through state or national parks or state scientific and natural areas unless the transmission line would not materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists. Economic considerations alone do not justify use of these areas for a high voltage transmission line	Not Applicable
4400.3450	**Prohibited Sites**	Not Applicable
Minn. Stat. §116C.57, Subd. 4 (applicable per	**Considerations in designating sites and routes** (1) Evaluation of research and investigations relating to the	3.6; 4.1-4.6; 6.0 A-C, E, F;

Table 1-1 Completeness Checklist		
Authority	**Required Information**	**Where**
Minn. Stat. §116C.575, Subd. 8)	effects on land, water and air resources of large electric power generating plants and high voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including base line studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air discharges and other matters pertaining to the effects of power plants on the water and air environment	Appendix G
	(2) Environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state	3.2.2, 6.0 G
	(3) Evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects	Not applicable
	(4) Evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants	Not applicable
	(5) Analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired	All of Section 4.0 in "Impacts", 6.0 E
	(6) Evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted	All of Section 4.0 in "Impacts", 6.0 M
	(7) Evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivisions 1 and 2	Not applicable to alternative process; see rejected routes discussion, 3.4
	(8) Evaluation of potential routes that would use or parallel existing railroad and highway rights-of way	3.2.3, 6.0 H
	(9) Evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations	3.4.1; 4.3.1, 6.0 H
	(10) Evaluation of the future needs for additional high voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications	3.2.2, 3.4, 6.0 G
	(11) Evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved	6.0 N
	(12) When appropriate, consideration of problems raised by other state and federal agencies and local entities	4.6, 5.1

1.2 NOTICE TO THE COMMISSION

Xcel Energy notified the Commission on December 4, 2006 that Xcel Energy intended to use the Alternative Permitting Process for the proposed Chisago HVTL Project. This complies with the requirement of Minnesota Rule 4400.2000, Subpart 2, to notify the Commission at least 10 days prior to submitting an application. A copy of this notice is attached in Appendix A.

2.0 INTRODUCTION

2.1 STATEMENT OF OWNERSHIP OF THE PROPOSAL AND AFFIDAVIT

Xcel Energy and Dairyland have jointly planned the Project, which will improve and maintain the electric service to the east central area of Minnesota, and northwestern Wisconsin.

Xcel Energy is headquartered in Minneapolis, Minnesota. Xcel Energy is a wholly owned subsidiary of Xcel Energy Inc., the fourth-largest combination electricity and natural gas energy company in the United States. Xcel Energy Inc. provides a comprehensive portfolio of energy-related products and services to 3.3 million electricity customers and 1.8 million natural gas customers through its regulated operating companies in Colorado, Kansas, Michigan, Minnesota, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Wisconsin and Wyoming. Xcel Energy owns over 17,300 miles of electricity transmission lines and more than 33,800 miles of natural gas pipelines, and operates regulated power plants that generate approximately 15,246 megawatts (MW) of electric power. Xcel Energy provides electricity services to approximately 1.3 million customers and natural gas services to 0.5 million residential, commercial and industrial customers in Minnesota. Xcel Energy serves the area that this Project covers in Minnesota and part of Wisconsin.

Xcel Energy (NSPM) will construct, own, operate and maintain the proposed Chisago 115 kV and 161 kV transmission lines, and the proposed modifications and additions at the Chisago County Substation, Lindstrom Substation and the new Lawrence Creek Substation, all located in Minnesota. The proposed Lawrence Creek Substation's location is west of Taylors Falls, Minnesota. Xcel Energy (NSPW) will construct, own, operate and maintain that portion of the 161 kV transmission line located in Wisconsin between the St. Croix Falls Substation and the Border Substation.

Dairyland will construct and own that portion of the 161 kV line in Wisconsin from the Border Substation to the Apple River Substation. Dairyland is a generation and transmission cooperative (G&T) headquartered in La Crosse, Wisconsin, that provides wholesale electrical requirements and other services for 25 electric distribution cooperatives and 19 municipal utilities in the Upper Midwest. In turn, these cooperatives and municipals deliver the electricity to consumers, meeting the energy needs of more than half a million people.

Dairyland was formed in December 1941 and operates generation plants and transmission lines for its member cooperatives. Dairyland's generating capacity consists of more that 1,100 MW of capacity from coal, hydro, natural gas, and landfill gas power plants. Dairyland maintains and operates 3,100 miles of transmission lines and 300 substations. Its service territory covers 44,500 square miles, encompassing 62 counties in four states (Wisconsin, Minnesota, Iowa and Illinois).

2.2 PERMITTEE/PROJECT MANAGER

The permittee/project manager for the Route Permit for the Project is:

Permittee: Northern States Power Company, a Minnesota Corporation d/b/a Xcel Energy
414 Nicollet Mall
Minneapolis, Minnesota 55401

Contact: Thomas G. Hillstrom
Senior Permitting Analyst

Address: 414 Nicollet Mall, MP-8A
Minneapolis, MN, 55401

Phone: (612) 330-6538

Fax: (612) 330-6590

Email: thomas.g.hillstrom@xcelenergy.com

2.3 CERTIFICATE OF NEED PROCESS SUMMARY

On November 16, 2006, Xcel Energy and Dairyland filed an application with the Public Utilities Commission (PUC) for a Certificate of Need (CON), PUC Docket No. E-002, ET-3/CN-04-1176, for the Project because it is longer than 10 miles and crosses a state border (Appendix B). The CON application describes the need to improve the reliability of the transmission system serving the northeastern fringe of the Minneapolis/St. Paul metropolitan area and northwestern Wisconsin. In addition to presenting the proposed Project, the alternatives analysis presented in the CON application examined four transmission system configuration alternatives at a variety of voltages, as well as the alternative of additional local generation. Based on an analysis of these four alternatives, two alternatives to the Project were selected for a detailed analysis.

The two alternatives analyzed in detail for the CON application consist of (i) rebuilding the existing Chisago County/Apple River transmission line at its current voltage, or (ii) reconfiguring the 69 kV system, to electrically sever the connection between Minnesota and Wisconsin. The rebuild alternative included construction of the Lawrence Creek Substation and upgrading transformers and conductors to carry more current. The reconfiguration alternative included construction of a new 69 kV circuit between the Border Substation and the St. Croix Falls Substation and upgrading conductors on three other lines.

The alternatives analysis concluded that the proposed 115/161 kV upgrade represents the best solution to the deficiencies identified in the 69 kV load serving system of East Central Minnesota and Northwestern Wisconsin, based on the following conclusions:

- The Project's higher voltage provides 50 percent greater load serving capability to meet future demand and reduces system losses.
- The Project addresses system deficiencies in northwestern Wisconsin with the fewest additional elements.
- Assuming construction at a new location within the Lower St. Croix National Scenic Riverway should involve underground portions to minimize scenic and recreational impacts, the Project is less costly than the alternatives with or without the consideration of system losses.

This Project also requires a Certificate of Public Convenience & Necessity (CPCN) from the Wisconsin Public Service Commission (WPSC). The CPCN for this Project was issued on June 10, 1999 in WPSC Docket No. 4220-CE-155/1515-CE-102. The CPCN process is where the WPSC determines the need and routes for projects within Wisconsin. A revised CPCN order was issued on February 5, 2002.

2.4 PROJECT LOCATION

The Project will be located in Chisago County, Minnesota (see Appendix C). Table 2-1 provides the township, ranges and sections in which the line will be located:

Table 2-1
Proposed Transmission Line Location

County	Township	Range	Sections
Chisago	34N	21W	1, 12, 13, 24, 25
		20W	25, 26, 29-36
		19W	24-35
		18W	19, 30

2.5 PROJECT PROPOSAL

Xcel Energy proposes to upgrade the existing 69 kV transmission line from the Chisago County Substation to the St. Croix River in Taylors Falls, Minnesota to a higher voltage. The Project transmission line proposal is shown on the maps in Appendix C and is broken down into the following components:

Transmission Line

- A conversion of 4.9 miles of the existing 69 kV transmission line to 115 kV between the Chisago County Substation and CSAH 19,
- A rebuild of 2.2 miles of the existing 69 kV transmission line to 115 kV between CSAH 19 and the Lindstrom Substation,

- A rebuild of 2.8 miles of the existing 69 kV transmission line to 115 kV between the Lindstrom Substation and the Great River Energy (GRE) Shafer Substation tap,
- A rebuild of 6.1 miles of the existing 69 kV line to 115 kV east of the Shafer Substation tap, and a 0.2 mile new alignment into the new Lawrence Creek Substation near Taylors Falls,
- A rebuild of 1.4 miles of the existing 69 kV transmission line to 161 kV operation between the new Lawrence Creek Substation and CSAH 20 in Taylors Falls, and a 0.4 mile new alignment where the line enters the Lawrence Creek Substation,
- A rebuild of 0.4 miles of the existing 69 kV transmission line to a buried 161 kV transmission line between CSAH 20 and TH 95 in Taylors Falls,
- A rebuild of 0.3 miles of the existing 69 kV transmission line to 161 kV between TH 95 and the St. Croix Falls Substation, and
- A realignment of 0.25 miles of the existing 69 kV Arden Hills line to enter the Lawrence Creek Substation.

Substations

- Modifications to equipment at the existing Chisago County and Shafer substations to change the line operation from 69 kV to 115 kV,
- Modifications to equipment and expansion of the existing Lindstrom substation to change the voltage from 69 kV to 115 kV, and
- Construction of a new Lawrence Creek Substation.

A full description of the Project route is in Section 3.1.

The transmission line upgrades are primarily along existing right-of-way (ROW); however, a small section of new alignment is required for this Project to interconnect the new Lawrence Creek Substation to the existing transmission system. The minor addition to the footprint of the Lindstrom Substation, and minor modifications to the existing Chisago County, Lindstrom and Shafer substations will be required to accommodate the new transmission lines, all of which is discussed in more detail in Section 3.5.

2.6 PROJECT SCHEDULE

Xcel Energy proposes to complete construction by the summer of 2010. A permitting and construction schedule summary is provided below:

Submit Certificate of Need Application	November 16, 2006
Submit Route Permit Application	January 5, 2007
CON & Route Permit Process Complete	November 2007
Survey Permission & Survey	January 2008
Line & Substation Design	January-August 2008
ROW Acquisition	August 2008-March 2009
Transmission Line & Substation Construction	March 2009-March 2010
Final ROW Contacts, Damage Settlements & Cleanup	March 2010-July 2010

2.7 PROJECT COSTS

The total cost for the Minnesota portion of the Project is approximately $29.3 million. Table 2-2 and Table 2-3 provide a breakdown of the approximate total Project transmission and substation costs.

Table 2-2
Transmission Line Construction Costs (Minnesota)

Route Segment	Cost
Segment 1 – Chisago Substation to Karmel Ave.	$0
Segment 2 – Karmel Ave. to Lindstrom Substation	$1,800,000
Segment 3 - Lindstrom substation to Shafer Tap	$2,700,000
Segment 4 – Shafer Tap to Lawrence Creek Substation (including Arden Hills reroute)	$3,800,000
Segment 5 - Lawrence Creek Substation to east of CSAH 20	$1,400,000
Segment 6 - CSAH 20 to TH 95 (underground)	$2,500,000
Segment 6 – TH 95 to St. Croix River Crossing	$1,000,000
ROW Costs	$1,500,000
Total	**$14,700,000**

Table 2-3
Substation Construction and Modification Costs (Minnesota)

Substation	Costs
Chisago Substation - Modification	$900,000
Lindstrom Substation - Modification	$3,600,000
Shafer Substation - Modification	$500,000
Lawrence Creek – New Construction	$9,600,000
Total	**$14,600,000**

Transmission line costs include items related to engineering, surveying, materials, design and construction labor and equipment, as well as the cost of removing the existing 69 kV structures. Costs for ROW are estimated costs associated with the acquisition of ROW and include expenses and labor. In general, mitigation/restoration costs are taken into account as part of the transmission line and substation construction costs.

Operating and maintenance costs for the transmission line will be nominal for several years since the line will be new and there is minimal vegetation maintenance required. Annual operating and maintenance costs for the 115 kV and 161 kV transmission voltages across Xcel Energy's Upper Midwest System averaged $500 per mile of transmission ROW over the past five years. The principal operating and maintenance cost will be inspections, usually done by a fixed wing aircraft on a monthly basis and by helicopter with infrared equipment once a year.

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-annually and annually. Maintenance and repair are performed on an as-needed basis, and therefore the cost varies from substation to substation.

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

3.1 ROUTE DESCRIPTION

Xcel Energy is requesting that the Commission grant a route permit for the Project as described below and shown on the route maps (Appendix C). Xcel Energy requests that an 18.3-mile route be approved that follows a 100-foot width from each side of the centerline (200 feet total) for the majority of the designated route. This will allow Xcel Energy reasonable flexibility in locating the transmission line along the rebuild portions of the route. In the vicinity of the new alignments going into and out of the proposed Lawrence Creek Substation, Xcel Energy requests a wider route width in order to provide for flexibility in siting the substation and transmission line configurations. The exact location of the proposed substation may need to provide for future expansion of the City's wastewater treatment ponds located north of the proposed substation site. As shown on Appendix C.5, Xcel Energy requests a 0.5-mile route width for the new 115 kV transmission line alignment entering the Substation from the south. For the new 161 kV transmission line alignment exiting the Substation to the east, Xcel Energy requests a 500-foot route width. Unless otherwise noted, the ROW that will be acquired from landowners for the transmission line will be 50 feet wide (25 feet each side of the transmission line centerline). The Project has six distinct segments, as described below.

Segment 1 – Chisago Substation to Karmel Avenue (No Construction)

Segment 1 is a 4.9 mile segment of an existing line between the Chisago County Substation to a point approximately 900 feet west of the intersection of Karmel Avenue and Stacy Trail/County State Aid Highway (CSAH) 19. The existing transmission line is currently operated at 69 kV but is capable of operating at 115 kV and would not require any alteration. The double circuit 115/69 kV portion of the route exits the Chisago County Substation to the west, turning south immediately for approximately 1,600 feet, before turning east along a field edge for approximately 2,000 feet. The transmission line then turns south for 3.5 miles, crossing CSAH 14 until it reaches Stacy Trail/CSAH 19. At this point the double circuit line separates and the proposed route follows the 69 kV transmission line along CSAH 19 east for approximately 3,300 feet.

Segment 2 – Karmel Avenue to Lindstrom Substation (Rebuild from 69 kV to 115 kV)

Segment 2 begins approximately 900 feet west of the intersection of Karmel Avenue and Stacy Trail/CSAH 19 and terminates at the Lindstrom Substation. It is approximately 2.2 miles in length. From its starting point west of Karmel Avenue, the route follows Stacy Trail/CSAH 19 approximately 1.9 miles east to Lincoln Road, where it turns south along Lincoln Road approximately 1,280 feet to the Lindstrom Substation, which it will enter from the west. The existing structures in this segment are not capable of supporting the proposed 115 kV line and will be replaced.

Segment 3 – Lindstrom Substation to Shafer Substation Tap (Rebuild from 69 kV to 115 kV)

As the 115 kV transmission line exits the Lindstrom substation to the south, it will follow the existing 69 kV transmission line ROW through the cities of Lindstrom and Center City for approximately 2.8 miles to the Shafer Substation. The existing structures in this segment are not capable of supporting the proposed 115 kV line and will be replaced.

The proposed transmission line will continue along the alignment of the existing 69 kV line and follow U.S. Highway 8 from just east of Elm Street to Center City. At Center City, the proposed line will deviate from U.S. Highway 8 and will continue northeast along the existing transmission ROW, crossing the northeastern edge of South Center Lake to the tap point into Shafer Substation. Xcel Energy proposes to rebuild the existing 69 kV line to 115 kV operation only to the tap point into and out of Shafer Substation.

Segment 4 – Shafer Substation Tap to Lawrence Creek Substation (Rebuild from 69 kV to 115 kV)

East of the Shafer Substation tap point, the route follows County Road 82/310th Street for approximately 6.1 miles, until it reaches the site for the new Lawrence Creek Substation. The existing structures in this segment are not capable of supporting the proposed 115 kV line and will be replaced. The new substation is proposed to be located in the southwest quarter of Section 26, Township 34N, Range 19W. In order to enter the new Lawrence Creek Substation, the transmission line will follow a new alignment for approximately 0.22 miles north from County Road 82/310th Street in the vicinity of the half section of Section 26. The exact alignment of this section of the route will be determined once the location of the Lawrence Creek Substation has been finalized. Approximately 0.49 miles of the existing transmission line would be removed for this reroute. At the substation, the voltage of the transmission line will change from 115 kV to 161 kV. The existing 69 kV line from Arden Hills, Minnesota will be doubled-circuited with the 115 kV line on the new 0.22 mile segment as it terminates at the Lawrence Creek Substation. Additionally, approximately 0.25 miles of the existing Arden Hills single-circuit 69 kV line will be rerouted to re-position the line for the double-circuit segment. The exact position of this re-alignment will depend on the final placement of the Lawrence Creek Substation.

Segment 5 – Lawrence Creek Substation to CSAH 20 (Rebuild from 69 kV to 161 kV)

Segment 5 is a 1.4-mile 161 kV segment from the proposed Lawrence Creek Substation to the top of the west bluff of the St. Croix River at Chestnut Street/CSAH 20. This segment is along a new alignment for approximately 0.4 miles east of the Lawrence Creek Substation, where it then turns northeast and follows the existing 69 kV line corridor for approximately one mile. The existing structures in the rebuild portion of this segment are not capable of supporting the proposed 161 kV line and will be replaced.

Segment 6 – CSAH 20 to St. Croix Falls Substation (Rebuild from 69 kV to 161 kV)

Segment 6 follows the existing 69 kV line for approximately 0.7 miles from the top of the west bluff to the St Croix River crossing. To mitigate visual impacts to the St. Croix River Valley, the 161 kV transmission line is proposed to be constructed underground from the top of the bluff to the base of the bluff at TH 95. From TH 95 east to the river crossing, the proposed line will be constructed aboveground.

As part of the rebuild, Xcel Energy will remove the existing overhead transmission line and all existing distribution lines from the west bluff. At the river crossing, the Project would result in a net reduction of 10 wires crossing the river (the removal of 15 existing wires crossing the river and installation of three conductors and two shield wires).

Wisconsin

Once it crosses the St. Croix River, the proposed transmission line continues to the Apple River Substation in Wisconsin. In the St. Croix Substation on the Wisconsin side of the river, the line would convert to underground construction, continuing underground east along Louisiana Avenue and south on Blanding Woods Road into the city industrial park. The underground 161 kV transmission line would then turn east and continue underground beneath Pine Street and East Pine Street to the Dairyland Border Substation. Near the Dairyland Border Substation, the 161 kV transmission line would transition to an overhead transmission line that would be double-circuited with an existing Dairyland 69 kV transmission line and follow an existing alignment southward to the Sand Lake Substation and generally eastward to the Apple River Substation. A complete description of the route approved by the WPSC is included in Appendix D.

3.2 ENGINEERING AND OPERATIONAL DESIGN

3.2.1 TRANSMISSION STRUCTURES AND ROW DESIGN

3.2.1.1 Transmission Structure Design

Xcel Energy proposes to use several types of structures for the Project, depending upon the segment. Single wood pole, horizontal post (braced post where applicable), two-pole wood H-frame (used for wide wetland crossings in Center City and Taylors Falls) and steel single pole davit-armed poles will be used throughout the Project, varying according to landscape and land use surrounding individual structures.

Segment One: This segment will not require any new construction and will use the existing, steel single pole davit-armed structures constructed in 1995 (Figure 3-1) for the double-circuit portion of the segment and wooden braced post structures constructed in 1969 for the single-circuit portion of the segment (Figure 3-2). The double-circuit structures are, on average, approximately 94-feet tall and have average spans of 385 feet. The single-circuit structures range in size from approximately

70 to 95 feet tall and have an average span of 285 feet. This segment will use the currently installed conductor, which is a 795 kcmil 26/7 Aluminum Conductor Steel Supported (ACSS). Improvements to the existing Chisago County Substation that are required to change the operating capacity are described in Section 3.5.1.

Segments Two through Five: Generally, these segments will use direct-imbedded wood pole, horizontal post (braced post where applicable) structures and single pole, galvanized steel davit-armed structures (used for tangents and corners) set on drilled pier concrete foundations. Steel pole structures will be used in downtown Lindstrom to reduce the number of poles in this area. Figure 3-3 shows the proposed 115 kV horizontal post structures. For large wetland complexes in Center City, two-pole wood H-frames will be used (Figure 3-4). Figure 3-5 represents the single pole, galvanized steel, 115 kV davit arm structures that will be constructed through a portion of the City of Lindstrom. Figure 3-6 shows the 161 kV horizontal post structures proposed east of Lawrence Creek Substation, and Figure 3-7 shows the 161 kV braced post structures. Direct imbedded single wood poles with horizontal line posts will be used for the 0.25-mile reroute segment of the 69 kV line from Arden Hills. The proposed wood pole, horizontal post structures will range in height from 70 to 75 feet with an average span of 245 to 260 feet between poles. The steel pole structures in Lindstrom and Center City will range in height from 80 to 90 feet with an average span of 185 to 370 feet. The wood H-frame structures will have an average height of 70 feet and a span of 600 feet. The 69 kV/115 kV double-circuit structures going into Lawrence Creek Substation will be steel poles with davit arms. The majority of the wood and steel pole structures will be designed to accommodate a distribution circuit under build.

Segment Six: The 161 kV transmission line is proposed to be buried within a concrete duct bank from CSAH 20 to TH 95 in Taylors Falls. Each of the three phases of the underground line will consist of a 3000 kcmil copper XLPE cable. The underground transmission line will also include a ground continuity conductor. The ground continuity conductor is typically a 600-V insulated 4/0 cable. This cable provides an end-to-end path for any fault currents and is necessary for proper relaying. Each phase of the underground transmission line will be placed within a separate 6-inch PVC duct within the duct bank. In total, eight 6-inch ducts for conductors (three conductors will be installed initially, and five ducts will be available as spares) and four 2-inch ducts for communication and ground wire, will be contained within a proposed 32 x 32-inch duct bank. Figure 3.8 shows a cross-section of the proposed underground transmission line duct bank. The five additional ducts will allow for the installation of a second cable per phase in the future to increase the load capacity of the underground section to match the overhead line capacity and allow space for two future full-length spare cables, if they are required for additional reliability.

At the two points where the transmission line transitions between overhead and underground, special transition structures will be used. The west transition structure near CSAH 20 is proposed to be a single shaft, self-supported, galvanized steel structure with six davit arms for support of the cable terminators (Figure 3-9). This structure will be approximately 105 to 120 feet tall. The east

transition structure near TH 95 is proposed to be a triple shaft, self-supported, self-weathering steel structure with two davit arms per shaft for support of the cable terminators (Figure 3-10) to transition to the two H-frame structures to the east. This structure will be approximately 65 to 80 feet tall. Xcel Energy proposes to use three shafts to reduce the height of the structure and self-weathering steel to blend into the landscape. At Chisago Street, an H-frame wood structure (with an approximate height of 80 feet and average span of 500 feet) will be used. At the river crossing, steel H-frame structures will be used, with an approximate height of 70 feet and a span over the river of greater than 600 feet (Figure 3-11).

All portions of the overhead transmission line will use a 795 kcmil 26/7 ACSS. This is the same conductor that is installed and currently operating in Segment 1. Average loading on the 115 kV line once it is in service is expected to be 117 mVA. Average loading at the in-service date for the 161 kV line is expected to be 108 mVA. For lightning protection, Xcel Energy will use 3/8-inch EHS steel shield wire.

The proposed transmission line and substation upgrades will be designed to meet or exceed all relevant state codes and the standards of the North American Electric Reliability Council (NERC) and Xcel Energy. Appropriate standards will be met for construction and installation, and all applicable safety procedures will be followed during and after installation. The proposed transmission lines will be equipped with protective devices that would de-energize the transmission line to safeguard the public should an accident occur and a structure or conductor fall to the ground. In addition, substation facilities will be fenced and access limited to authorized personnel. The underground portion will be properly marked and manhole covers will prevent unauthorized access.

Table 3-1 provides a breakdown of the structure types and ROW requirements along the proposed route.

Table 3-1
Summary of Transmission Line Engineering Design

Description	Length (miles)	Structure Type	Average Structure Height (feet)	Average Span Length (feet)	ROW Required (feet)
Segment 1 – Chisago Substation to Karmel Ave.	4.9	Existing double-circuit, single pole davit arm, steel; existing single-circuit, single pole braced line post, wood	94 (double-circuit) 70 – 95 (single-circuit)	385 (double-circuit) 285 (single-circuit)	Existing 50-foot
Segment 2 – Karmel Ave. to Lindstrom Substation	2.2	Single-circuit, single pole horizontal line post, wood, distribution underbuild	75	260	Existing ROW

Table 3-1 Summary of Transmission Line Engineering Design					
Description	**Length (miles)**	**Structure Type**	**Average Structure Height (feet)**	**Average Span Length (feet)**	**ROW Required (feet)**
Segment 3 - Lindstrom substation to U.S. Highway 8	0.8	Single-circuit, single pole horizontal line post, steel, distribution underbuild	85-90	185-290	Existing ROW and new easements where necessary in Lindstrom
Segment 3 - U.S. Highway 8 to Shafer Tap	2.0	Single-circuit, single pole horizontal line post, steel, distribution underbuild (wood H-frames across large wetland complexes)	80 (single steel) 70 (H-frame)	370 (single steel) 600 (H-frame)	Existing ROW
Segment 4 – Shafer Tap to Lawrence Creek Substation	6.3	Single-circuit, single pole horizontal line post, wood, distribution underbuild	70	280	Existing and new 50-foot ROW
Segment 5 - Lawrence Creek Substation to east of CSAH 20	1.4	Single-circuit, single pole horizontal line post, wood, distribution underbuild	70	245	Existing and new 50-foot ROW
Segment 6 - CSAH 20 to TH 95	0.4	Underground	N/A	N/A	Existing 50-ft ROW
Segment 6 - TH 95 to St. Croix River	0.25	Single-circuit, H-frame, wood	80	500	Existing 50-ft ROW
Segment 6 - St. Croix River Crossing	0.05	Single-circuit, H-frame, wood	70	>600	Existing ROW

Figure 3-1
Steel Pole Double-Circuit Davit Arm 115 kV Structure

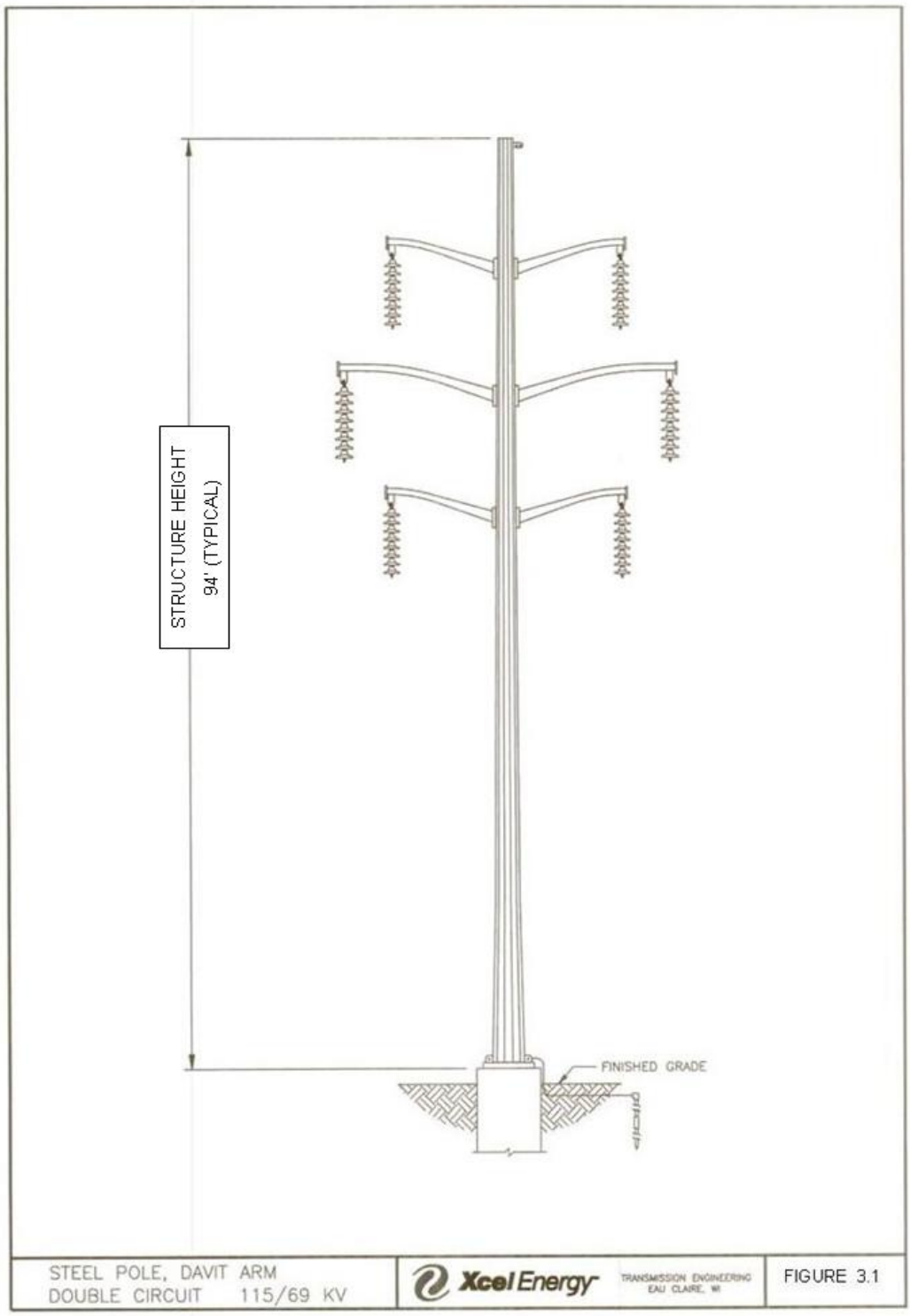


Figure 3-2
Wood Pole Single-circuit Braced Post 115 kV Structure

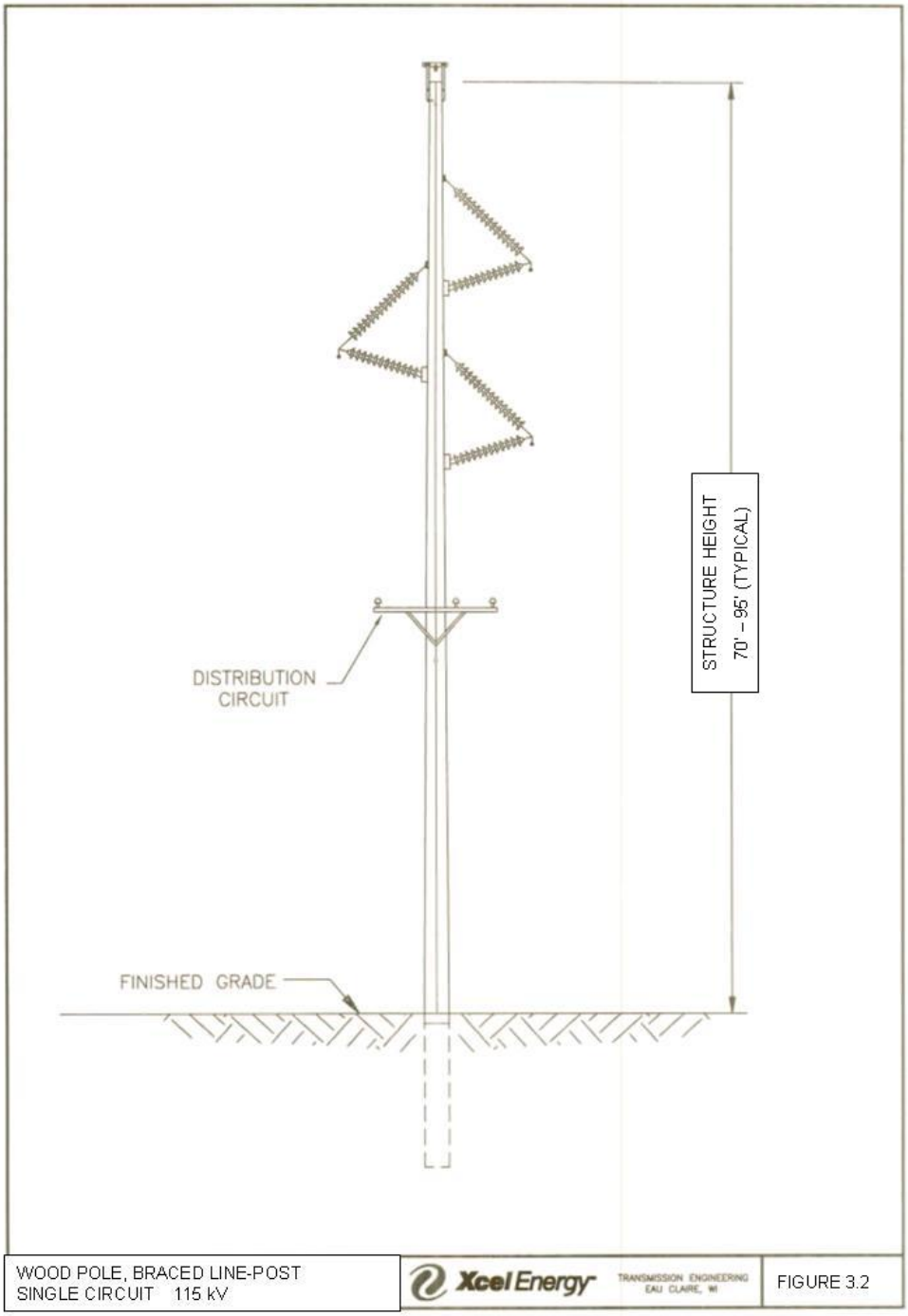


Figure 3-3
Wood Pole Single-circuit Horizontal Post 115 kV Structure

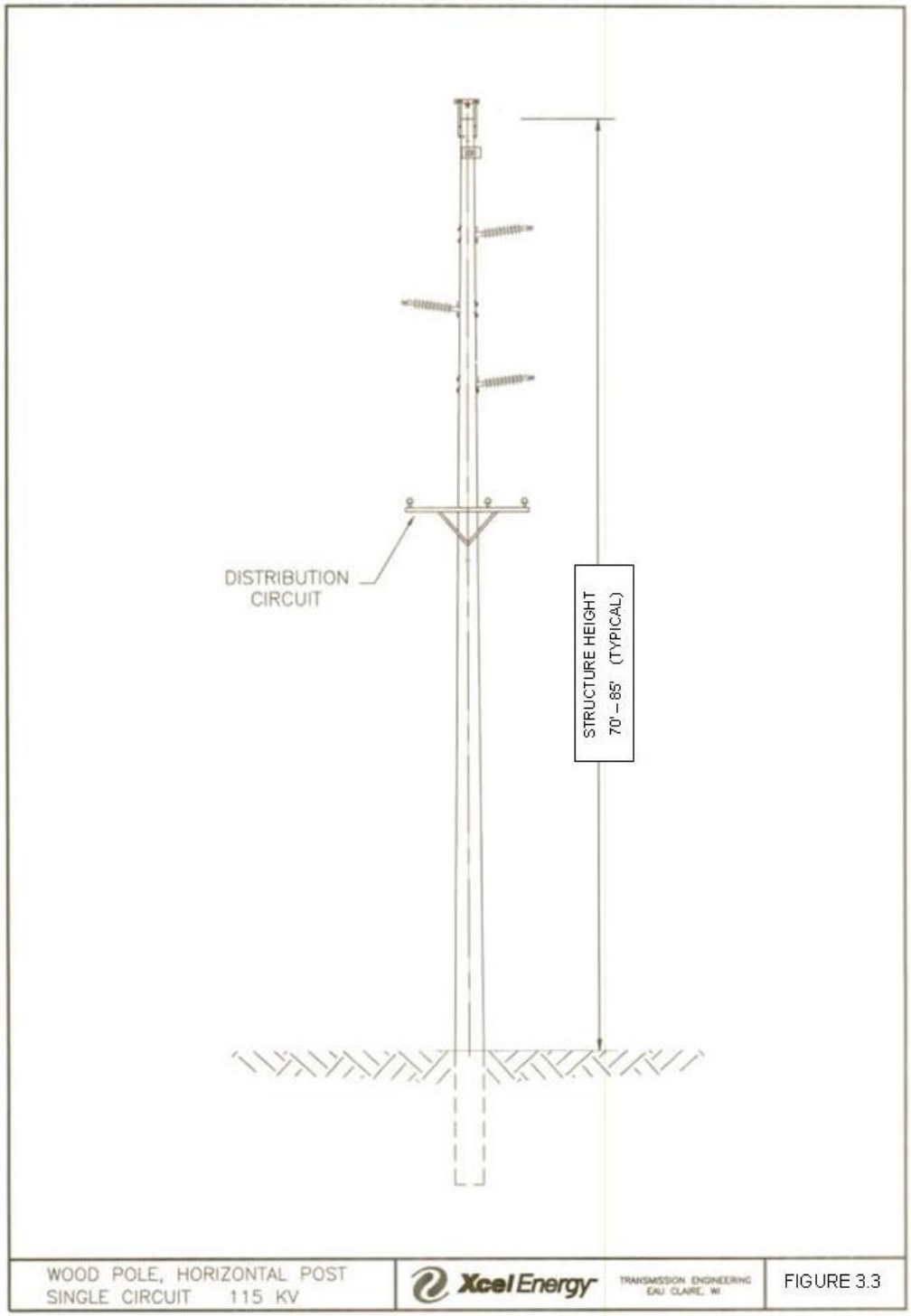


Figure 3-4
Wood H-frame Single-circuit 115 kV Structure

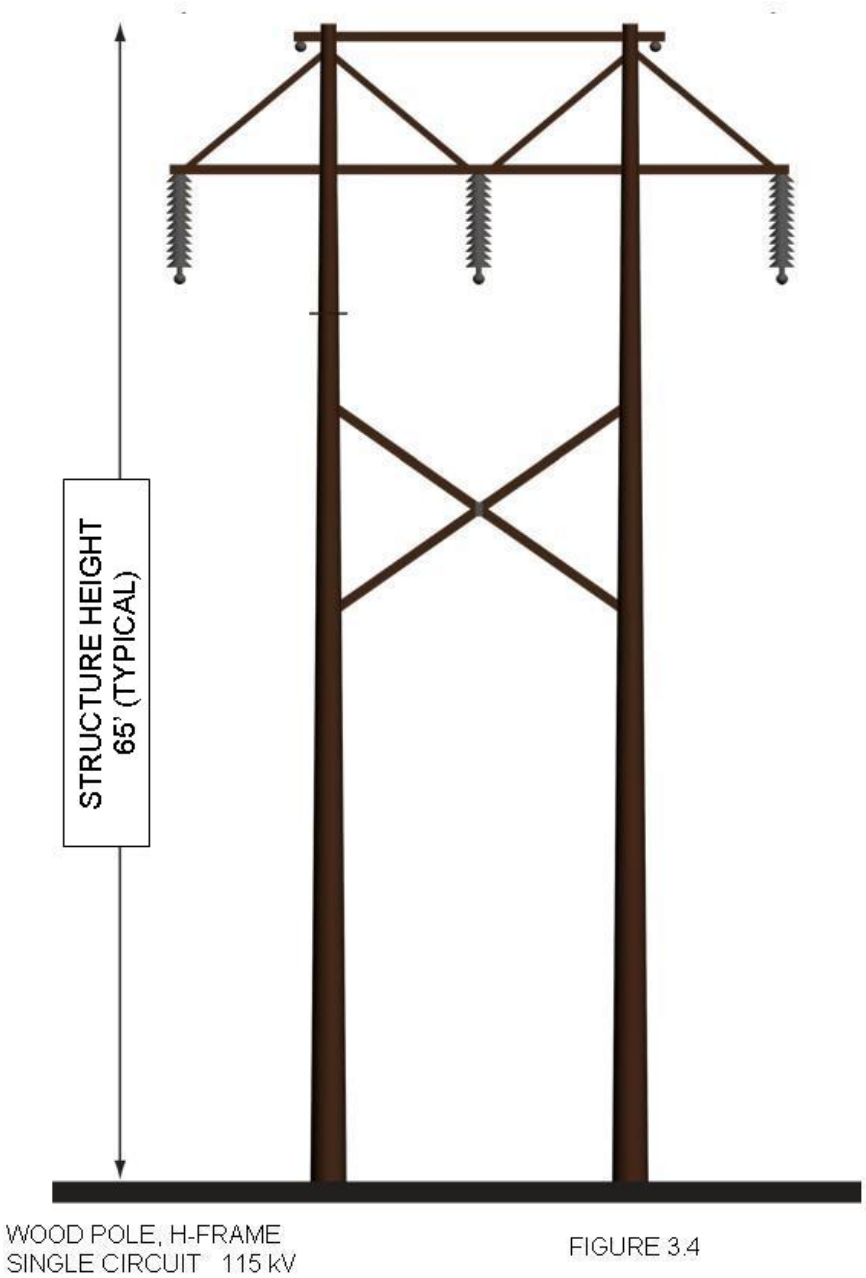


Figure 3-5
Steel Pole Single-circuit Horizontal Post 115 kV Structure

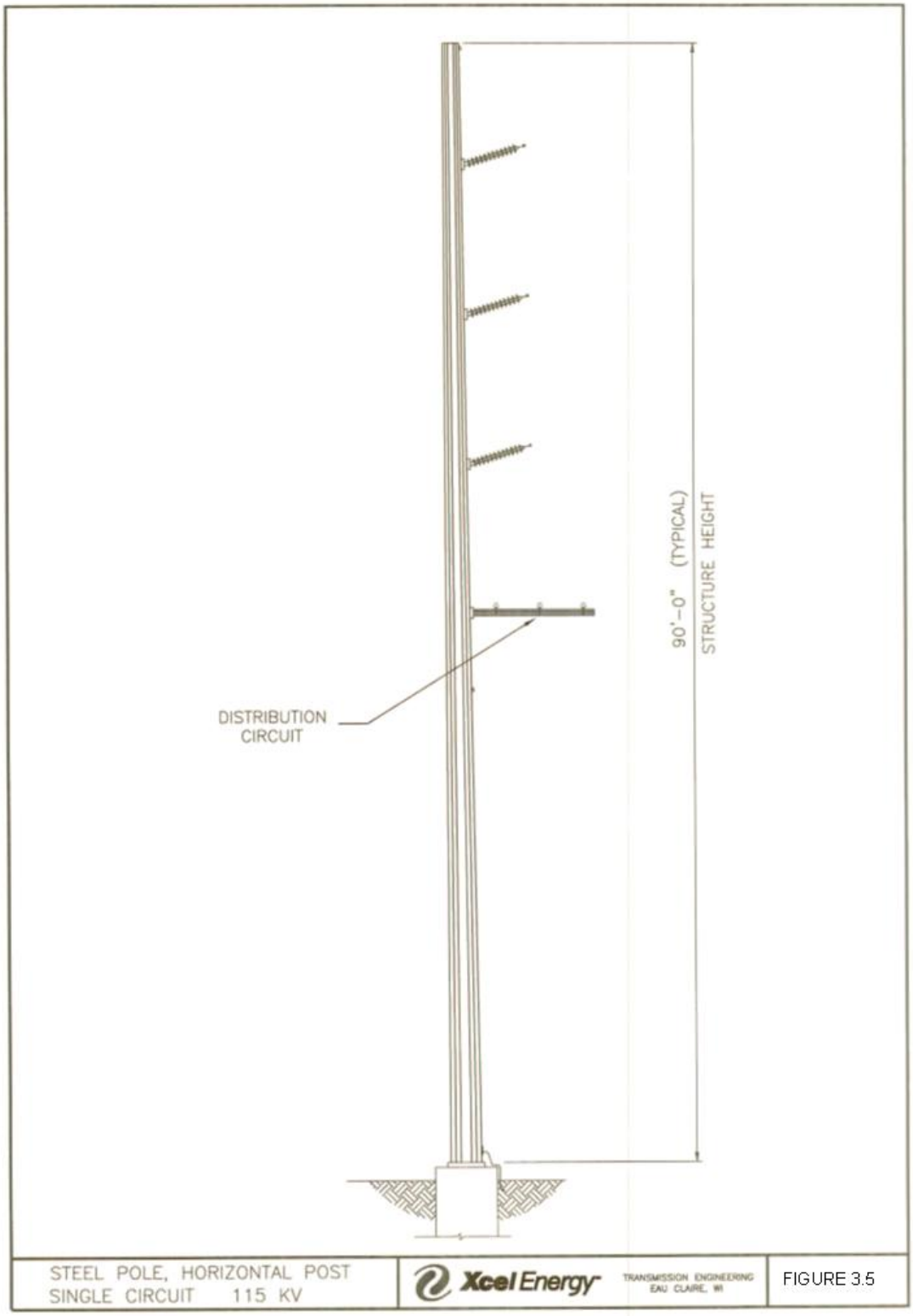


Figure 3-6
Wood Pole Single-circuit Horizontal Post 161 kV Structure

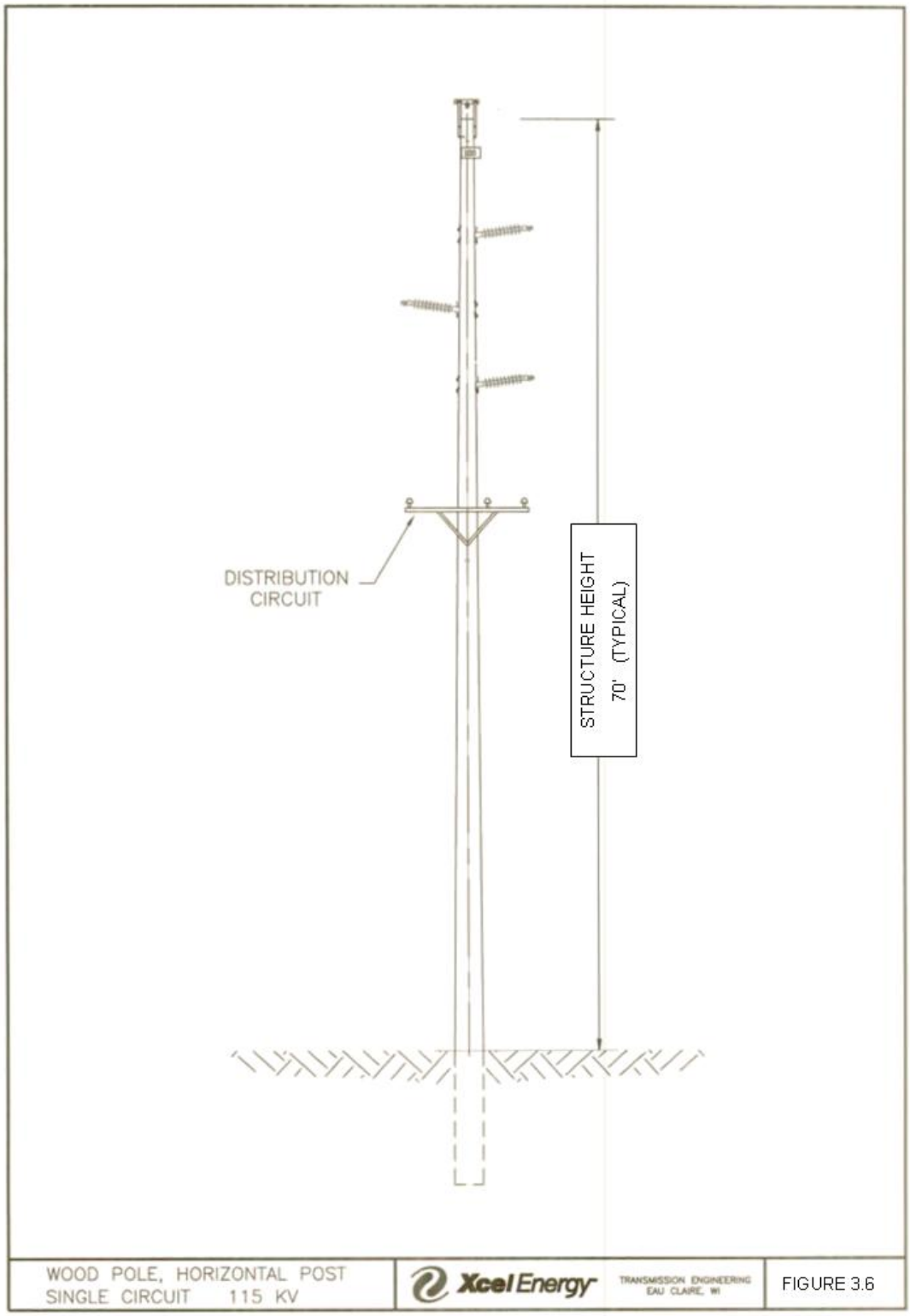


Figure 3-7
Wood Pole Single-circuit Braced Post 161 kV Structure

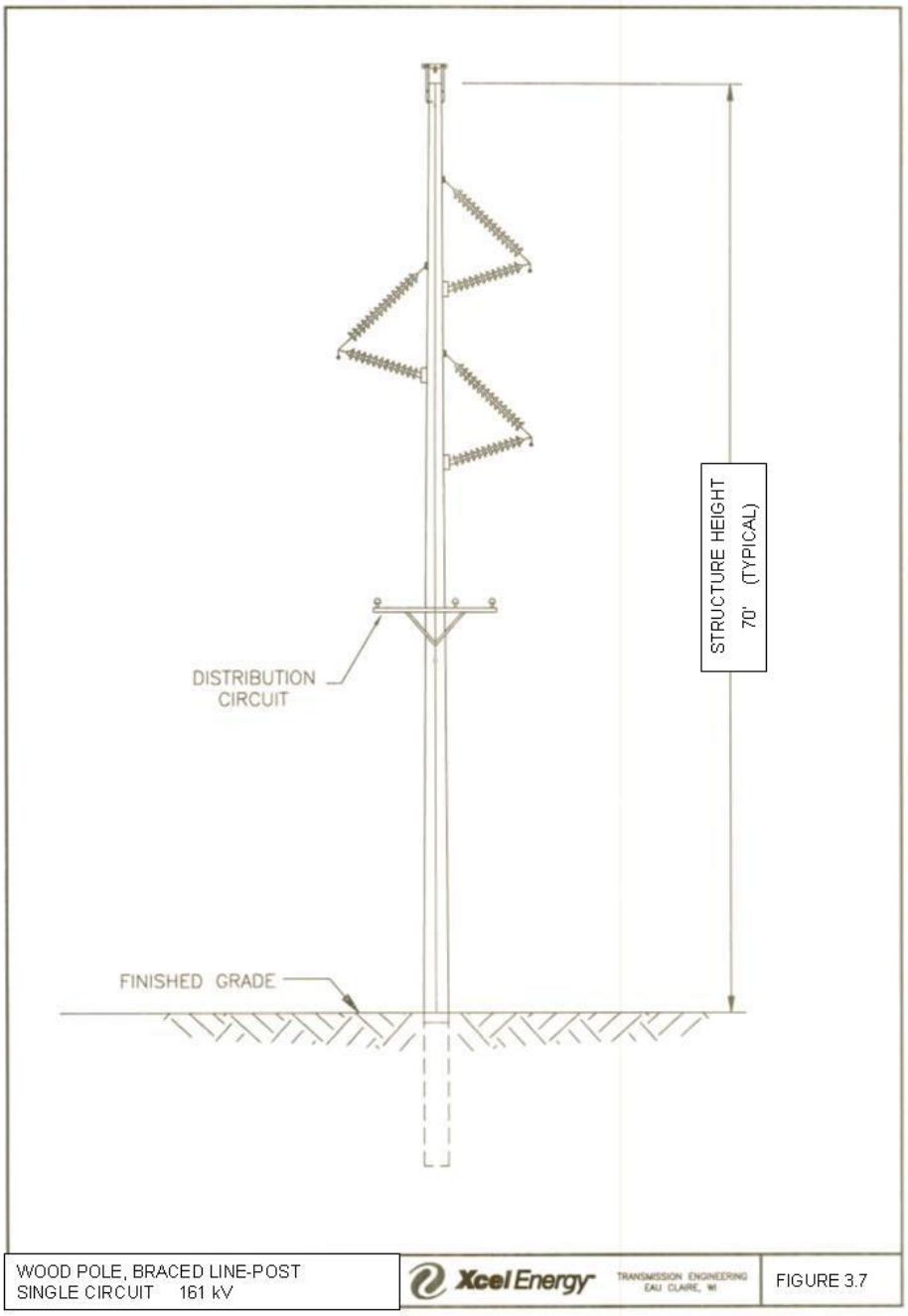
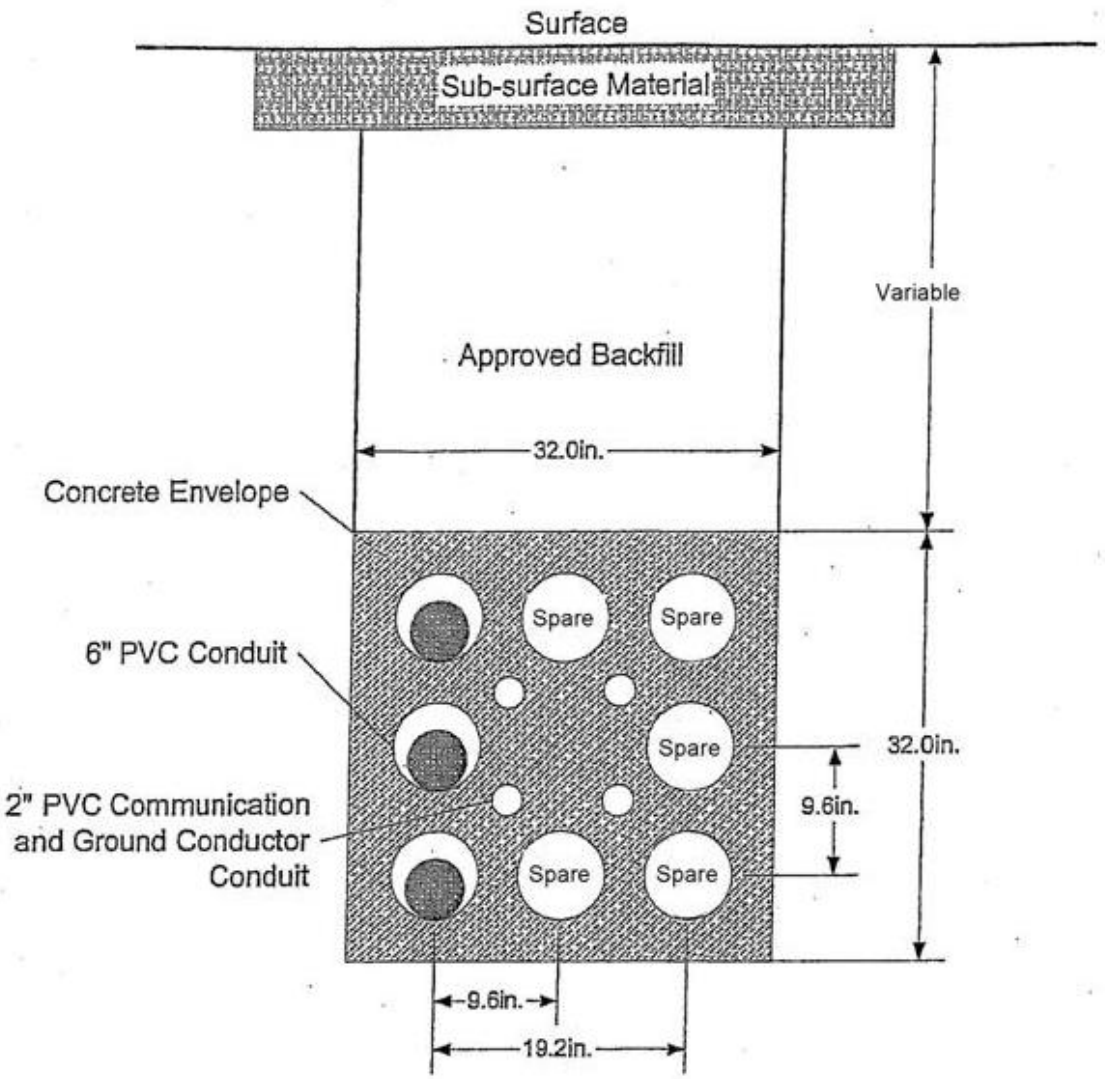


Figure 3-8
Typical 3 x 3 Single-circuit 161 kV Duct bank Cross-section



TYPICAL 3x3 SINGLE-CIRCUIT
161 kV DUCTBANK CROSS-SECTION

FIGURE 3.8

Figure 3-9
Steel Pole Overhead to Underground 161 kV Transition Structure (West)

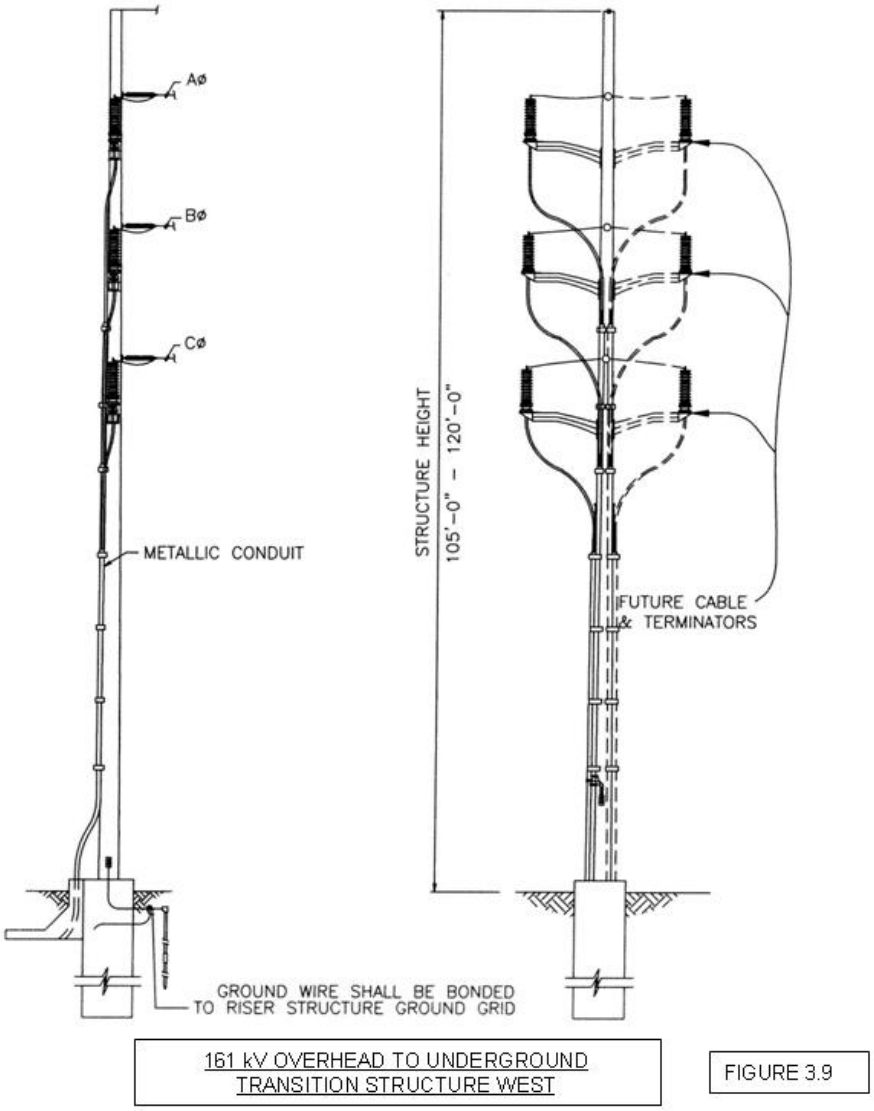


Figure 3-10
Steel Pole Overhead to Underground 161 kV Transmission Structure

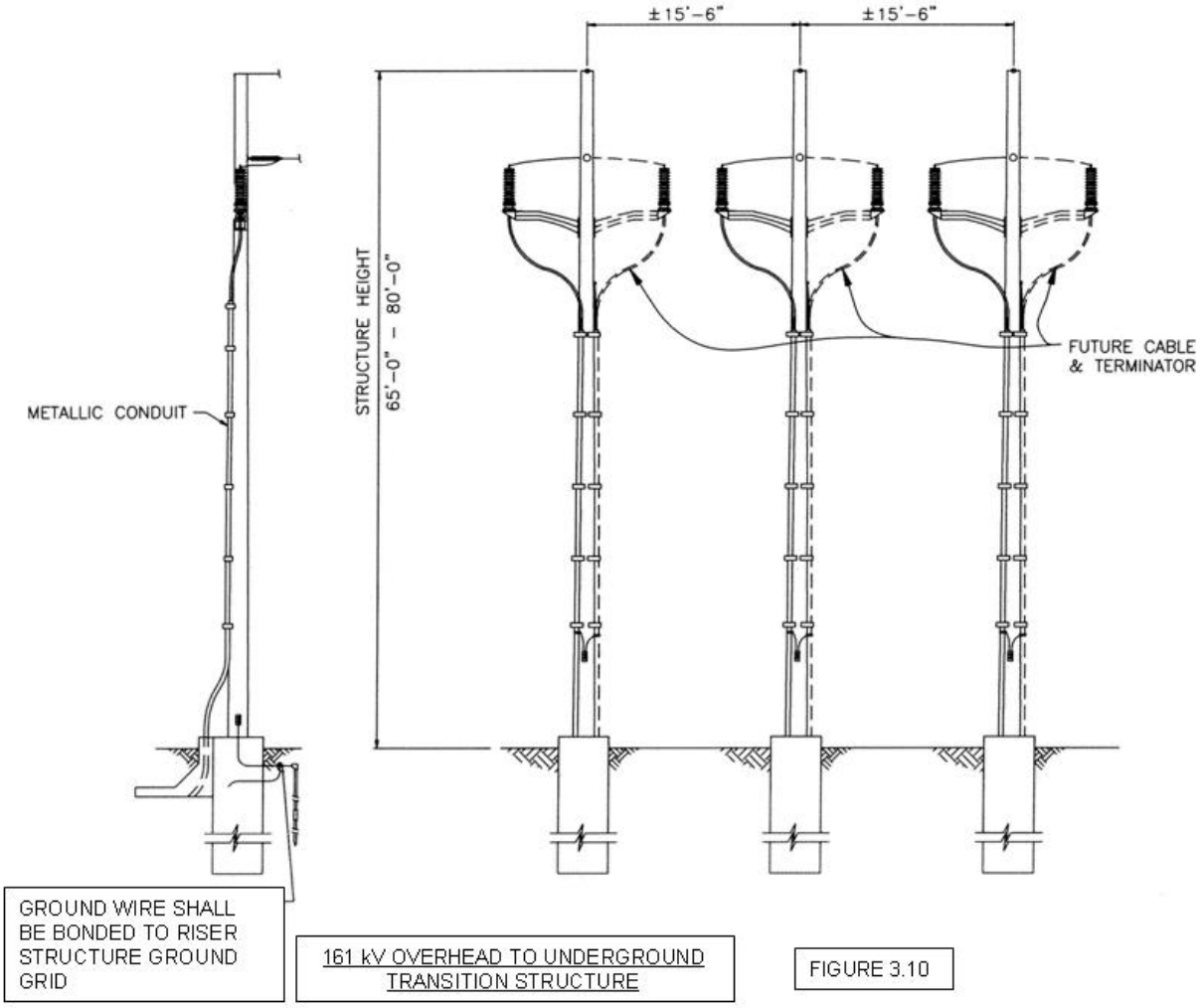
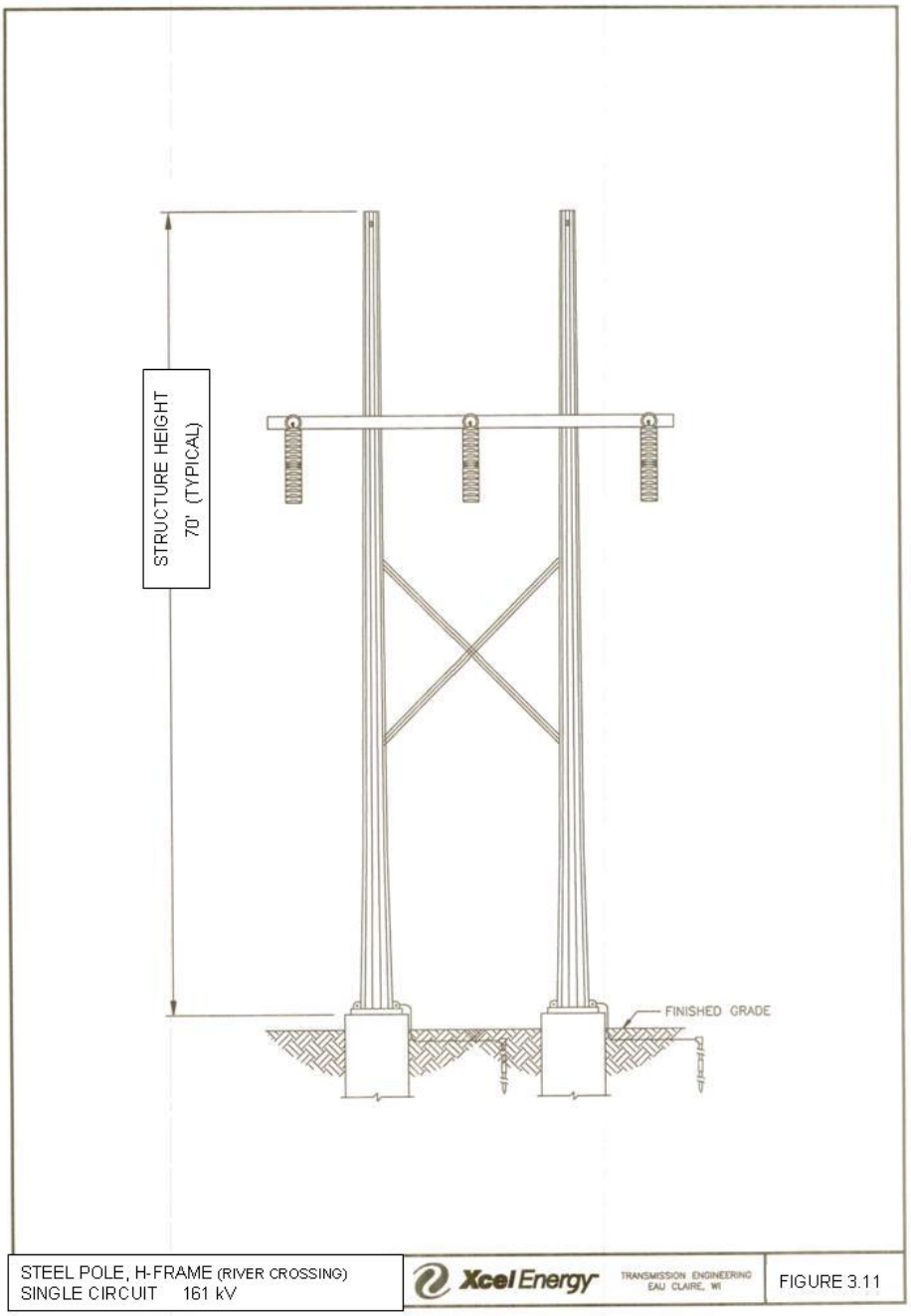


Figure 3-11
Steel H-frame Single-circuit 161 kV Structure



3.2.1.2 Transmission Right-of-Way Required

Overhead Line ROW Requirements

The majority of the proposed route will follow and utilize existing transmission line and road ROW. Xcel Energy anticipates that the only new ROW that will be required is where approximately 0.8 miles of new easements will be required to tie the transmission lines into the new Lawrence Creek Substation. This will include the new alignment of the 115 kV line from the Shafer Substation tap entering the substation from the south, the new alignment of the 161 kV line to Wisconsin exiting the substation to the east, and the reroute of the existing Arden Hills 69 kV line into the substation from the south.

The existing ROW consists of a combination of easements, road ROW and fee-owned property. Xcel Energy will acquire easements for the areas where the transmission line will follow new ROW or require additional ROW. In general, the Project will be designed to fit along a 50-foot easement, which is the same as the easement for the existing 69 kV line. Where the Project parallels a road, the required width will overlap the road ROW. When the transmission line is following a cross-country route, the ROW width will be 50 feet.

Underground Line ROW Requirements

The underground transmission line duct bank will be installed approximately in the center of existing ROW, unless field conditions require that it be offset to one side or the other. No additional ROW will be required for this portion of the route.

3.2.2 DESIGN OPTIONS TO ACCOMMODATE FUTURE EXPANSION

The transmission line is designed to reflect current safety codes and the projected load requirements indicated by the planning studies. The majority of the transmission line will be designed for adequate strength and height, to accommodate a distribution circuit under build and maintain clearance over the lifetime of the facility.

For the buried segment of the 161 kV line, a single 3000 kcmil copper cable initially will be installed per phase of the underground segment of the transmission line. Depending on actual soil thermal characteristics, the capacity of the buried transmission line cable segment would most likely be lower than the overhead line segments due to the heat dissipation rate of the soil compared to air. When additional load capacity is needed to match the overhead load capacity in the underground segment of the project, a second 3000 kcmil copper cable per phase will be installed in the duct bank, run up the transition structures and connected to the overhead conductor. These cables would allow for additional capacity on the single 161 kV circuit along the underground portion of the Project; double-circuiting is not anticipated. The transition structures, for changing from overhead to

underground construction and vice versa, will have arms installed for future installation of cable terminations for the second set of cables.

3.2.3 IDENTIFICATION OF EXISTING UTILITY AND PUBLIC RIGHTS-OF-WAY

The Project follows existing utility and public ROW for 97 percent of the route, except where indicated on Table 3-2.

Table 3-2
Summary of Utility, Public ROW & Other Corridor Sharing

Description	Length (miles)	Existing Transmission ROW (miles)	Municipal ROW (miles)	County Highway ROW (miles)	U.S. Highway ROW (miles)	New ROW (miles)
Segment 1	4.9	4.9	0.9	0.6	0.0	0.0
Segment 2	2.2	2.2	0.0	2.2	0.0	0.0
Segment 3	2.8	2.8	0.8	0.0	1.3	0.0
Segment 4	6.3	6.1	0.0	6.1	0.0	0.2
Segment 5	1.4	1.0	0.0	0.0	0.0	0.4
Segment 6	0.7	0.7	0.0	0.0	0.0	0.0

3.3 RIGHT-OF-WAY ACQUISITION, CONSTRUCTION, RESTORATION, AND MAINTENANCE PROCEDURES

3.3.1 RIGHT-OF-WAY ACQUISITION

Once a Route Permit is issued for the Project, Xcel Energy will begin to contact landowners. The majority of the landowners are expected to be aware of the Project since Xcel Energy implemented a notice plan in September 2006. In addition, Xcel Energy will be notifying landowners of this Project filing which will include the description of the Commission's permitting process. Once the Project is approved, landowners will be provided a copy of the route permit and information on how the ROW acquisition process and Project will proceed at the first contact. Xcel Energy Land Rights Agents will work with the landowners at an early stage to answer questions about the Project regarding surveys and soil investigations prior to construction. As the design of the line is further developed, contacts with the owners of affected properties will continue and Xcel Energy will begin the negotiation and acquisition phase to obtain any additional land or easement rights for the facility. Property owners will be advised as to the construction schedules, and consulted with to determine any necessary access paths to the construction sites and to identify any vegetation clearing required for the Project.

The Project will require soil analysis at several points along the route to assist with the design of the foundations and underground portions of the transmission line. Xcel Energy will inform the landowners at the initial survey consultation that soil borings may occur. An independent

geotechnical testing company will take and analyze these borings. Survey crews also work with local utilities to identify underground utilities along the route. This minimizes conflicts or impacts to existing utilities along the route.

Where possible, staging and lay down areas will be located within the ROW and limited to previously disturbed or developed areas. When additional property is temporarily required for construction, temporary limited easements (TLE) may be obtained from landowners for the duration of construction. TLEs will be limited to special construction access needs or additional staging or lay down areas required outside of the proposed transmission line ROW. Typically, a previously disturbed or developed area with sufficient space to lay down material and pre-assemble structure components or hardware is used. In some cases, existing substation sites are used if there is adequate space.

3.3.2 TRANSMISSION CONSTRUCTION PROCEDURES

3.3.2.1 Overhead Transmission Line Construction

Construction will begin after required approvals are obtained, easement acquisition is completed and necessary soil investigations have occurred. A detailed construction schedule will be developed based upon availability of crews, outage restrictions for lines that may be affected, weather conditions and any restrictions placed on certain areas for minimizing impacts from construction (such as permit conditions for sensitive environmental features).

In general, the impacts of electric transmission structures are temporary and are limited to the areas directly around the structure location. Impacts are associated with large construction vehicles operating in and accessing the construction site.

Site Clearing

The ROW will be cleared of the amount of vegetation necessary to construct, operate and maintain the proposed transmission line. It is standard practice to remove any vegetation that would be a danger to the line at a mature height, or where roots might interfere with operation in the area of the buried segment. Also, any vegetation that is in the way of construction equipment may have to be removed. Wood from the clearing operation will be offered to the landowner or removed from the site. Brush will be chipped and disposed of on the ROW, except in residential or other developed areas.

Portions of vegetation that are disturbed or removed during construction of transmission line towers will naturally reestablish to pre-disturbance conditions. Resilient species of common grasses, sedges, and shrubs typically have few problems with reestablishment after disturbance. Areas of significant soil compaction and disturbance from construction activities along the proposed transmission line corridor will require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control erosion and assist in re-establishing

vegetation include, but are not limited to: erosion control blankets, silt fences, hay bales and prompt reseeding (either hydroseeding or planting individual seeds or seedlings of native species).

Erosion control methods will be implemented to minimize runoff during construction. Xcel Energy construction crews or an Xcel Energy contractor will comply with local, state, National Electrical Safety Code (NESC) and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, ROW widths, erection of power poles and stringing of transmission line conductors.

Wood Pole Construction

Wood pole structures will be directly imbedded in the ground. These structures will be erected by auguring or excavating a hole typically 10 to 15 feet deep and 3 to 4 feet in diameter for each pole. The structures will then be set and the holes backfilled with excavated material, crushed rock or concrete, depending on the site conditions and structure requirements. Any excess soil may be offered to the landowner or removed from the site. In poor load-bearing soil conditions, a galvanized steel culvert is sometimes installed, with the pole set inside.

Steel Pole Construction

The steel pole structures will require a hole dug 15 to 25 feet deep and 4 to 8 feet in diameter for each pole location. Any excess soil will be removed from the site unless otherwise requested by the landowner. The steel structures will be supported by a drilled concrete pier foundation. Structures located in poor or wet soil conditions may require a specially engineered foundation, such as a steel caisson which may be vibrated into the ground. Structures located in areas of exposed or shallow bedrock may have drilled concrete pier foundations or shallow concrete spread footings, depending upon the quality and hardness of the rock found from the soils investigation.

Typical Pole and Conductor Installation

Poles will be delivered to either the staked location or a Project storage yard. If the poles are delivered to the location where they will be installed, they will be placed on the ROW out of the clear zone of any adjacent roadways or designated pathways. Insulators and other hardware will be attached while the pole is on the ground. The pole will then be lifted, placed and secured on the foundation by a crane.

Once the structures have been erected, shield wire and conductors will be installed from stringing setup areas usually established every two miles within the ROW along the Project area. Conductor stringing operations will also require brief access to each structure to secure the conductor wire to the insulators and to install shield wire clamps once final sag is established. Temporary guard or clearance poles will be installed as needed over existing distribution or communication lines, streets, roads, highways, railways or other obstructions after any necessary notifications are made and

permits obtained. This ensures that conductors will not obstruct traffic or contact existing energized conductors or other cables.

3.3.2.2 Transmission Line River Crossing Construction

Limited grading may be necessary near the crossing of the St. Croix River, where it may be necessary to create a level area for construction access and activities at the locations of the poles, including use of drilling equipment, cranes and bucket trucks. Approximately 0.1 acres of level land is necessary for this purpose, and Xcel Energy's preferred methodology is to locate it within the easement so that tree removal would be confined to those that would be removed as part of routine maintenance. To the extent practicable, existing structures and wire will be used to install the new facilities.

For construction of the river crossing, stringing ropes will be fastened to the old conductor. Wire stringing equipment will be set up on both sides of the river. The old conductor will then be pulled across the river in one direction. At the stringing setup site, the new wire will be fastened to the ropes and pulled back across the river to the equipment setup on the other side. The ropes and wire are pulled, while under tension, in order to minimize sag where the new wire could be damaged if scraped by hitting the ground or rocks. No construction activities will occur within the river itself.

3.3.2.3 Underground Transmission Line Construction

Xcel Energy is proposing to place a portion of this Project in the Taylors Falls/St. Croix Falls area underground, using trench construction. This will include digging a trench, constructing a duct bank and then backfilling the duct bank. The transmission line cable will then be pulled through the ductwork.

Trenching and duct installation would follow commonly accepted practices. The route would be surveyed, the trench location established and other buried utilities in the area would be marked.

Before trenching begins, any existing pavement will be saw cut and removed above the proposed location of the duct bank and the trench excavated with a backhoe. Individual 6-inch PVC ducts and 2-inch ducts for communication cable and ground continuity conductors are placed in spacers in the trench, concrete forms are set, and a concrete envelope is poured around the ducts for mechanical protection and to provide good heat transfer. Clean fill is used to fill the trench around and above the duct bank, and either a steel plate or concrete cap is placed over the duct bank to provide protection to shallow duct banks before restoring the trenched area. Fluidized thermal backfill may be used where the thermal characteristics of the soil are inadequate, but is not expected to be necessary for this project. In unpaved areas, steel plates or a concrete cap are placed over a shallow duct bank before replacing the topsoil. The steel plates or concrete cap provide protection from accidental contact during excavating activities by others. A duct bank installed deeper than 30 inches generally will not have a protective steel plate or concrete cap. In paved areas, a sub-base is used under the restored pavement.

Underground cable near the transition structures will be direct buried in thermal soil fill and protected by a steel plate or concrete cap. Direct burial allows cable to transition from the duct bank to being 'racked' in a vertical configuration on the transition structures. Direct burial also allows 'S' curve of cable to be installed to provide extra length of cable for replacing a failed or damaged cable terminator in the future.

A typical progression rate for underground construction would be a few days for each 200-foot section of trench. About 500 to 700 feet of trench is open at one time. Steel plates are typically placed over open sections of trench when crews are not at that location.

Underground vaults (manholes) are located where the underground cable requires splicing. Vault installation requires a larger excavation, a few feet larger than the vault itself. Vaults of this size are often provided in two or even three pieces. Once the vaults are placed and ducts run into them, the area is backfilled (and paved if in a street). Duct bank and manhole installation, and pavement restoration are often completed well before cable is installed. Cable installation itself does not require further excavation, except at direct burial locations near the transition structures at the end of the duct banks. Access to the end of the duct bank is required to pull the cable into the duct bank and route the cable to the transition structures.

The finished duct bank will be approximately three feet wide, with excavation 5 to 6 feet wide at the bottom to provide space for installation of ducts, spacers and concrete forms, and wider at the top to provide side slope stability, which may vary somewhat according to local conditions (e.g. the presence of rock or boulders).

Once the duct bank and vaults are in place, backfilled and the surface restored, the cable will be pulled from each transition pole to the vault or vice versa depending on the contractor's preference. Areas near each transition pole, and around the manhole, will be blocked from traffic to allow equipment placement and provide a safe working area.

The underground cable in lengths of 1,500 to 2,000 feet will be provided on individual reels and set up at one transition pole or vault location. A winch at the other location pulls the cables one at a time through the individual ducts. A crane will be used to lift the cables and cable terminations into position on the transition structures. Temporary scaffolding will be built at the transition structures for workers to install the cable terminations onto the cables.

3.3.3 RESTORATION PROCEDURES

During construction, crews will attempt to limit ground disturbance wherever possible. Upon completion of construction activities, landowners will be contacted to determine if any additional restoration due to construction damage is necessary. Disturbed areas will be restored to their original condition to the maximum extent practicable and as negotiated with the landowner. Post-construction reclamation activities include removing and disposing of debris, dismantling all temporary facilities (including staging and lay down areas), alleviating compaction, employing

appropriate erosion control measures and reseeding areas disturbed by construction activities with vegetation similar to that which was removed.

For the segment of line proposed to be buried, the ground above the trench would be backfilled with clean fill (or fluidized thermal backfill if soil conditions require it) and capped with soil. Any excess excavated soils would be hauled away or stored onsite.

If any street pavement is removed as part of burying the transmission line, the trench would be backfilled with thermal backfill and the road would be recapped at-grade with the surrounding pavement.

Once construction is completed, each landowner is contacted by the ROW agent to determine if any damage has occurred as a result of the construction project. If damage has occurred to crops, fences, or the property, the Applicants will compensate the landowner for the damages caused. In some cases, an outside contractor may be contacted to restore the damaged property as nearly as possible to its original condition.

3.3.4 MAINTENANCE PROCEDURES

Periodic ROW access is required to perform inspections and maintenance or to repair any damage. Regular maintenance and inspections will be performed during the life of the facility to ensure its continued integrity. Periodic inspections will be performed by ground personnel on foot, snowmobile, ATV, by pick-up truck or by aerial means. Inspections will be limited to the ROW and areas where obstructions or terrain may require off-ROW access. If problems are found during inspection, repairs will be performed.

The ROW will be managed to remove vegetation that interferes with the operation and maintenance of the line. ROW clearing practices include a combination of mechanical and hand clearing, along with herbicide application, where allowed, to remove or control vegetation. Current Xcel Energy practice provides for the inspection of transmission lines of less than 230 kV every five years.

Annual operating and maintenance costs associated with 69 kV, 115 kV and 161 kV transmission voltages across Xcel Energy's upper Midwest system have averaged on the order of $500 per mile for transmission ROW over the last five years. Actual line specific maintenance costs will depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types and materials, age of the line, etc. The majority of the Project will be routed through agricultural and residential land with relatively little tree maintenance required. Vegetation management will also be required in the underground portion of the line. Since the structures will be new, there will be minimal maintenance required for several years. The principal operating and maintenance cost will be inspections usually done by air monthly and on the ground once a year. Steel poles and concrete foundations would be expected to require minimal maintenance. Wood poles will require inspection at approximately 10-year intervals to ensure structural integrity.

Maintenance for underground transmission lines is minimal. Maintenance is generally limited to removal of non-compliant vegetation above the duct bank and prevention of construction of structures or grade changes by landowners over the duct bank. The only potential maintenance on the underground transmission line would be caused by accidental dig-ins. Duct bank repair and damaged cable replacement would then be required. The only other maintenance would be repair of the cable terminators on the transition structures. Failure of cable terminators generally occur immediately after the cable is energized, so they would be replaced during construction and most likely would not be a regular maintenance item. Vandalism of terminators would require replacement or repair, but such vandalism has been rare.

3.4 DISCUSSION OF REJECTED ROUTE ALTERNATIVES

3.4.1 ROUTE ALTERNATIVES ON NEW RIGHTS OF WAY

During the preliminary analysis of this Project, Xcel Energy investigated route alternatives that would avoid rebuilding the existing line through the cities of Lindstrom and Center City. However, options were limited for the following reasons:

- The transmission line needs to connect to the existing Lindstrom Substation. Access to that substation is limited.

- There are numerous large and small lakes in the area surrounding this Project. This feature restricts the ability to relocate the transmission line in a new location between the Lindstrom and Shafer substations.

- A new alignment would require new ROW, which would have the potential to impact existing or planned land uses. Constructing poles along new ROW would have a greater potential to impact wetlands, farming operations, and previously undisturbed natural areas.

Given these factors, it was determined that of all the potential corridors for the Project to follow, the existing 69 kV alignment was the best.

3.4.2 ROUTE ALTERNATIVES ON EXISTING ROW

Xcel Energy considered a number of options to upgrade the existing 69 kV line. The CON Application contains a discussion of several system configuration alternatives that were analyzed and rejected. As documented in the CON Application, four transmission system configuration alternatives were examined with two of these alternatives carried forward for detailed analysis in the CON Application. These two alternatives to the Project are:

1. **The 69 kV Rebuild Alternative**

   This alternative would rebuild the 69 kV transmission line from Chisago County Substation to the Apple River Substation near Amery, Wisconsin. Similar to the proposed Project, the

Project would completely rebuild the existing line and include a new Lawerence Creek substation.

2. **The 69kV Reconfiguration Alternative**

The reconfiguration alternative would electrically separate the 69 kV system serving the Minnesota portion of the local area from Wisconsin portion of the 69 kV local system. This alternative includes construction of a new 3-mile 69 kV line from the DPC Border substation to the St. Croix Falls substation. This alternative would also require upgrades to the Border tap to Apple River 69 kV line, the King Substation to Willow River Substation 115 kV line, and the Red Rock Substation to River Falls Substation 115 kV line.

The economic and operational rationale for rejecting these alternatives is presented in the CON Application.

3.4.3 DOWNTOWN LINDSTROM ROUTE ALTERNATIVES

The downtown area of Lindstrom presented a particular challenge for this Project. While it would be preferable to avoid placing a transmission line through the downtown Lindstrom area, the transmission line's connection to the Lindstrom Substation is needed to supply power to the City and, as described above in Section 3.4.1, access to the substation and through the City is constrained on both the north and south by large lakes. This limited the options available when considering other alternatives.

The Project was developed with considerable attention to the City's aesthetic concerns, physical constraints and future re-development plans. Section 5.1.2 describes the process of working through these factors with City representatives, consideration of an underground alternative and the mitigative measures included in our overhead proposal. The goal of this process was to provide a proposal that addresses the concerns of the City while providing the needed benefits of the Project.

3.4.4 TAYLORS FALLS ALTERNATIVES

In the City of Taylors Falls, underground construction was considered between CSAH 20 and the St. Croix River. However, the presence of a deep marsh and shallow bedrock between TH 95 and the river would require invasive construction techniques (open trenching and possible blasting) that would result in considerable impacts to the wetlands and woods present in this area. Therefore, burying the transmission line through the area east of TH 95 was rejected because it would be too damaging to the environment.

The visual impacts of the existing transmission line through this area are minimal due to the lower, flat terrain. In general, this portion of the transmission line is not visible from the Wisconsin side of the river. The use of relatively short wood and self-weathering steel H-frame structures will maintain the relatively low aesthetic impact of this portion of the transmission line. Spanning open water areas will allow Xcel Energy to minimize wetland impacts.

Section 5.1.2 describes Xcel Energy's ongoing coordination with the City in order to come up with a proposal that addresses the City's concerns, minimizes impacts to the environment and provides the needed benefits of the Project.

3.5 SUBSTATIONS

Xcel Energy proposes to construct one new substation (Lawrence Creek Substation) as part of the Project. In addition, modifications to the Chisago County, Lindstrom and Shafer substations will be required to support the new transmission line.

3.5.1 CHISAGO COUNTY SUBSTATION

The Chisago County Substation is located in Section 1, Township 34N, Range 21W. This substation is owned and operated by Xcel Energy.

Modifications to this substation will be required to accommodate the upgrade of the 69 kV section of the existing double-circuit 115/69 kV transmission line to 115 kV. This work includes the addition of one 115 kV circuit breaker and associated foundations and structural steel within the existing graded and fenced area. This work will not require expansion of the existing substation.

A drawing of the proposed changes is included in Appendix E.1.

3.5.2 LINDSTROM SUBSTATION

The Lindstrom Substation is located west of the City of Lindstrom in Section 33, Township 34N, Range 20W. This substation is owned and operated by Xcel Energy.

Modifications to this substation will be required to accommodate the single-circuit 115 kV transmission line. The existing graded area will be expanded approximately 50 feet to the east, to accommodate the new equipment. At the northeast corner, an area approximately 100 feet east to west and 23 feet north to south will also be expanded and graded. These expansions represent approximately 14,000 ft^2 in additional graded area to the existing site. Steel structures and associated concrete pier foundations will be installed to support high-voltage switches and buswork. Concrete pad foundations will be installed to support high-voltage circuit breakers and transformers. The existing 69/12.5 kV power transformers will be replaced with two new 115/12.5 kV power transformers. One new 115 kV circuit breaker will be installed.

A drawing of the proposed changes is included in Appendix E.2.

3.5.3 SHAFER SUBSTATION

The Shafer Substation is located in Section 35, Township 34N, Range 20W. This substation is owned by Great River Energy (GRE) and operated by Xcel Energy.

Modifications to this substation will be required to accommodate the single-circuit 115 kV transmission line. The existing 69/12.5 kV power transformer will be replaced with a new 115/12.5 kV power transformer. A new 115 kV three-way switch mounted on a transmission line structure will be installed along the transmission line route to facilitate the new 115 kV connection to the substation. This work will not require expansion of the existing substation.

A drawing of the proposed changes is included in Appendix E.3.

3.5.4 LAWRENCE CREEK SUBSTATION

The new Lawrence Creek Substation is proposed to be located north of County Road 82 in Section 25, Township 34N, Range 19W. Approximately 8.0 acres of property will need to be acquired to accommodate the substation construction for this Project.

The initial fenced area will be approximately 475 x 206 feet, or approximately 2.2 acres. The ultimate size of the fenced area will be 475 x 375 feet, or approximately 4.1 acres. Concrete pier foundations will be installed to support numerous steel w-flange (I-beam) columns and platforms positioned throughout the substation for the placement of high-voltage bus-work and switches. Concrete pad foundations will be installed for supporting high-voltage circuit breakers and transformers. A steel control house will also be erected within the fenced area that will enclose protective relay and control equipment. The main pieces of electrical equipment are included in the following list. However, the substation will be designed and constructed in a manner that will allow the future installation of additional circuit breakers and transformers:

- (4) 115kV Circuit Breakers
- 69 kV Circuit Breaker
- 115/161 kV Power Transformer
- 115/69 kV Power Transformer
- 115/12.5 kV Power Transformer
- Control House
- (1) 12.5 kV Switchgear Enclosure
- High-voltage buswork, switches and associated steel supporting structures

A drawing of the proposed Substation is included in Appendix E.4.

3.5.5 SUBSTATION PROPERTY ACQUISITION, CONSTRUCTION, RESTORATION AND MAINTENANCE PROCEDURES

3.5.5.1 Property Acquisition

Xcel Energy will need to purchase land for the new Lawrence Creek Substation and for the expansion of the east side of the Lindstrom Substation. All of the modification required to the remaining existing substations will be constructed on the existing property.

An 8.0 acre parcel will be acquired for the Lawrence Creek substation. Approximately 0.3 acres will be acquired in order to expand the Lindstrom substation to the east.

As the routing process proceeds, contacts with the landowners of affected properties will occur. After the Route Permit is obtained, the negotiation and acquisition phase will begin to obtain the necessary property for these two substations. Whenever possible, Xcel Energy will seek to obtain new ROW through voluntary purchase.

Staging areas for construction will be located within Xcel Energy's substation property boundaries. If additional property is temporarily required for construction, TLEs may be obtained from landowners for the duration of construction. TLEs will be limited to special construction access needs or additional staging areas required outside of the Project area.

3.5.5.2 Substation Construction Procedures

This Project will include substation work at various locations. There will be minor work at the Chisago County Substation to tie-in the transmission line. This work includes the addition of two 115 kV circuit breakers and associated foundations and structural steel. Expansion of the existing graded and fenced area will not be required.

The construction for new and expanded substations includes site preparation work, which involves grading and leveling the site with heavy equipment. All vegetation will be cleared from the substation footprint area, the substation driveway area, as well as a buffer of 15 feet outside the substation fence. It is standard practice to remove all vegetation from within the substation. Vegetation on the property outside of the substation footprint and driveway is normally left undisturbed, except where it must be removed to allow for transmission line access to the substation.

Once the grading activities have been completed, the site perimeter will be enclosed with a security fence. This will be a standard chain link fence that is 7 feet in height and topped with a 1-foot extension having three strands of barbed wire. Concrete pier foundations will be installed to support numerous steel w-flange (I-beam) columns and platforms positioned throughout the substation for the placement of high-voltage bus-work and switches. Concrete pad foundations will be installed for supporting high-voltage circuit breakers and transformers. In the case of the new

Lawrence Creek Substation, a steel control house will also be erected within the fenced area to enclose protective relay and control equipment. Sections 3.5.1 to 3.5.4 list the electrical equipment to be installed at each substation.

3.5.5.3 Restoration Procedures

Upon completion of construction activities, Xcel Energy will restore the remainder of the site. Post-construction reclamation activities include the removing and disposing of debris, dismantling all temporary facilities (including staging areas), employing appropriate erosion control measures and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Where appropriate, Xcel Energy will incorporate methods to screen the final site.

3.5.5.4 Maintenance Procedures

Xcel Energy will perform periodic inspections, maintain equipment and make repairs over the life of the substation. Xcel Energy will also conduct routine maintenance as required to remove undesired vegetation that may interfere with the safe and reliable operation of the substation.

3.6 ELECTRIC AND MAGNETIC FIELDS

Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The term EMF refers to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For the lower frequencies associated with transmission lines, it may be more helpful to separate EMF into electric and magnetic fields. The intensity of the electric field is related to the voltage of the line, and the intensity of the magnetic field is related to the current flow through the conductors. Transmission lines operate at 60 hertz (cycles per second). This is the non-ionizing band of the electromagnetic spectrum.

3.6.1 ELECTRIC FIELDS

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

The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/M). Transmission line electric fields near ground are designated by the difference in voltage between two points (usually 1 meter). Table 3-3 provides the electric fields at maximum conductor voltage for the proposed transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

Table 3-3 Calculated Electric Fields (kV/m)									
	Distance to Proposed Centerline								
Type	-300'	-200'	-100'	-50'	0'	50'	100'	200'	300'
Existing 69 kV Line	0.003	0.008	0.03	0.11	0.17	0.13	0.04	0.008	0.003
Proposed 115 kV Line	0.01	0.02	0.07	0.20	0.30	0.30	0.07	0.02	0.01
Proposed 161 kV Line	0.017	0.04	0.15	0.46	0.70	0.43	0.16	0.04	0.16

The proposed 161 kV transmission line will have a maximum magnitude of electric field density of approximately 0.70 kV/M underneath the conductors, one meter above ground level, whereas the 115 kV transmission line will be approximately 0.3 kV/M. This is significantly less than the maximum limit of 8 kV/M, which has been a permit condition imposed by the Minnesota EQB in other High Voltage Transmission Line (HVTL) applications. The Minnesota EQB standard was designed to prevent serious hazard from shocks when touching large objects parked under extra HVTL of 500 kV or greater.

3.6.2 MAGNETIC FIELDS

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

The question of whether exposure to power-frequency (60 Hz) magnetic fields can cause biological responses or even health effects has been the subject of considerable research for the past three decades. There is presently no Minnesota statute or rule that pertains to magnetic field exposure. The most recent and exhaustive reviews of the health effects from power-frequency fields conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report, "NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" on June 15, 1999, following six years of intensive research. NIEHS concluded that there is little scientific evidence correlating extra low frequency electromagnetic field (EMF) exposures with health risk.

The Minnesota State Interagency Working Group on EMF Issues, consisting of members from five state agencies found similarly. The group issued "A White Paper on EMF Policy and Mitigation Options" in September of 2002, wherein it concluded:

> 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, and 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…
>
> * * *
>
> *The Minnesota Department of Health (MDH) concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects*. However, as with many other environmental health issues, the possibility of health risk from EMF cannot be dismissed. (Emphasis added)

These conclusions are consistent with those reached by the Department of Health in 2000 and similar to conclusions of scientific committees convened by the U.S. Congress, and other international and national health agencies including the 1999 final report by the NIEHS. Table 3-4 provides the estimated magnetic fields based on the proposed lines and structure designs. The expected magnetic field for the proposed structure type and voltage has been calculated at various distances from the center of the pole. As Table 3-4 shows, the magnetic fields are expected to be higher directly over the underground segment, when compared to levels directly below the overhead 161 kV portion. This is consistent with other studies comparing EMF levels of buried versus overhead transmission lines. Generally, levels are slightly higher for buried segments directly over the line; however, the levels quickly decline with distance, and EMF levels are comparable to or lower than those associated with overhead lines within a short distance (generally within 20 feet).

Table 3-4 Calculated Magnetic Flux Density (milligauss)																		
Line Type	**Underbuild**	**Condition**	**Amps**	**-300**	**-250**	**-200**	**-150**	**-100**	**-50**	**-25**	**0**	**25**	**50**	**100**	**150**	**200**	**250**	**300**
115 kV/115 kV double-circuit	No	average	221/587	1.0	1.4	2.1	3.6	7.6	22.0	41.0	61.0	54.0	28.0	9.0	4.2	2.4	1.5	1.0
		peak	382/1014	1.6	2.4	3.6	6.3	13.0	37.0	70.0	105.0	94.0	49.0	16.0	7.2	4.1	2.6	1.8
115 kV single-circuit	Yes	average	587	0.6	0.9	1.4	2.5	5.5	17.0	33.0	47.0	30.0	16.0	5.6	2.7	1.6	1.1	0.8
		peak	1014	1.0	1.5	2.4	4.3	9.4	29.0	56.0	78.4	51.0	27.0	9.5	4.7	2.8	1.8	1.3
161 kV single-circuit overhead	Yes	average	387	0.5	0.8	1.2	2.1	4.6	14.0	26.5	36.0	23.0	12.3	4.4	2.2	1.3	0.9	0.6
		peak	667	0.9	1.3	2.0	3.6	7.7	23.0	44.0	59.0	39.0	21.0	7.6	3.7	2.2	1.5	1.0
161 kV single-circuit under ground	No	average	387	0.1	0.1	0.1	0.2	0.4	1.3	4.5	52.0	3.9	1.0	0.2	0.1	0.1	0.1	0.1
		peak	667	0.1	0.1	0.2	0.3	0.6	2.2	7.7	90.0	6.7	1.7	0.4	0.2	0.1	0.1	0.1

Xcel Energy provides information on EMF to the public, interested customers and employees. Xcel Energy will provide measurements for landowners, customers and employees who request them. In addition, Xcel Energy has followed the "prudent avoidance" guidance suggested by most public agencies. This includes using structure designs that minimize magnetic field levels and siting facilities in locations with the fewest number of people living nearby.

3.6.3 STRAY VOLTAGE

Stray voltage is defined as a natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. Electrical systems, including farm systems and utility distribution systems, must be grounded to the earth, by code, to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution, ground currents, EMFs or earth currents. It only affects farm animals that are confined in areas of electrical use. It does not affect humans.

Stray voltage has been raised as a concern on some dairy farms because it can impact operations and milk production. In July 1998, the PUC issued a report entitled the *Final Report of the Science Advisors to the Minnesota Public Utility Commission: Research Findings and Recommendations Regarding Claims of Possible Effects of Currents in the Earth on Dairy Cow Health and Milk Production*. The Report concluded that "…with the present body of evidence, it is our best judgment that magnetic fields from earth currents or any other contributory sources in the dairy barn are not of sufficient levels to cause any health or production problems in dairy cows." Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, the electric distribution system directly serving the farm or the wiring on a farm was directly under and parallel to the transmission line. These circumstances are considered in installing transmission lines and can be readily mitigated. No stray voltage issues are anticipated with this Project.

4.0 ENVIRONMENTAL INFORMATION

This section provides a description of the environmental setting, potential impacts and mitigative measures Xcel Energy has proposed, where necessary, to minimize the impacts of siting, constructing and operating the Project. Xcel Energy is required to provide cost estimates for the various mitigative measures proposed to address issues. The majority of the measures proposed are part of the standard construction process at Xcel Energy. Unless otherwise identified in the following text, the costs of the mitigative measures proposed are considered nominal.

4.1 DESCRIPTION OF ENVIRONMENTAL SETTING

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

The towns of Lindstrom, Center City, Shafer and Taylors Falls are all within the Project area. The Chisago County natural environment is home to a variety of wildlife and natural resources. The St. Croix River and Sunrise River bound the Project on the east and west, providing ample recreational opportunities to the area's residents and supporting a profitable tourism industry.

4.2 HUMAN SETTLEMENT

4.2.1 PUBLIC HEALTH AND SAFETY

Proper safeguards will be implemented for construction and operation of the facility. The Project will be designed to comply with local, state, NESC and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and ROW widths. Xcel Energy construction crews and/or contract crews will comply with local, state, NESC and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures will be followed during and after installation of the transmission line. This will include clear signage during all construction activities.

The transmission line will be equipped with protective devices to safeguard the public from the transmission line if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment will de-energize the transmission line, should such an event occur. In addition, the substation facilities will be fenced and access limited to authorized personnel. The underground portion of the line will be properly marked, and manhole covers will be heavy enough to prevent unauthorized access. The costs associated with these measures have not been tabulated separately from the overall Project costs since these measures are standard practice for Xcel Energy.

In 2004, Chisago County widened County Road 37 from the Western City limits of Center City to Taylors Falls. As part of this road project, the county bought new ROW that overlapped with Xcel Energy's easements along this segment. The County widened the roadway within Xcel Energy's easement and received approval from the Minnesota Department of Transportation (Mn/DOT) on its clear zone requirements. In November 2006, the Chisago County engineering staff was contacted regarding the possibility of moving the proposed structures away from the highway. County staff indicated that the distance of the existing structures to the road is sufficient and the County does not wish to pursue the purchase of additional easements that would be necessary to move the proposed line away from the roadway.

Where it is considered prudent, Xcel Energy will attempt to maximize the distance between the proposed line and County Road 37. However, any adjustment to the alignment will be constrained by the existing easement.

4.2.1.1 Mitigative Measures

The activities associated with the Project are not expected to impact public health and safety. No additional mitigative measures are necessary.

4.2.2 COMMERCIAL, INDUSTRIAL, RESIDENTIAL LAND USE

The transmission line primarily crosses through areas zoned agriculture. The Chisago County zoning map shows that the lands that the transmission line crosses are zoned Agricultural, Rural Residential I and Rural Residential II (Appendix F).

While Chisago County's zoning map indicates that the areas the transmission line will cross in Segment 1 are primarily zoned Agricultural, a portion of the transmission line near Lindstrom is zoned Rural Residential II. Segment 2 of the route crosses through areas west of the City of Lindstrom zoned Rural Residential I and Rural Residential II. East of the City of Lindstrom, Segment 4 passes through Agricultural zones. During a field survey, construction and development in the area west of the City of Lindstrom on CSAH 14 (zoned Rural Residential II) was observed. Adjacent lands owned by the City of Lindstrom were also being developed.

Segment 5 crosses Agricultural zones within the areas outside of Taylors Falls.

The proposed Lawrence Creek Substation will be constructed on land that is zoned Agricultural within Chisago County. The land occupied by the substation equipment will be removed from agricultural production. The remaining area may be available for lease to continue farming operations.

The Project will cross three municipalities: Lindstrom, Center City and Taylors Falls. There are approximately 212 homes and 48 businesses within 300 feet of the proposed ROW along the entire route. Lindstrom and Center City account for approximately 147 of these properties. A more

complete description of the distances of residences to the proposed transmission line is in Appendix G.

For the portions of Segments 2 and 3 that pass through the City of Lindstrom, the transmission line crosses areas zoned General Business District (B-2), Central Business District (CBD), Industrial District (I-1), Single Family Residential District (R-1) and High Density Residential District (R3) (Appendix F). Approximately 10 to 15 new homes are within 150 feet of the existing transmission line, in the northwest corner of the City of Lindstrom. Other lots in this area were being graded for construction in the fall of 2006, and it is likely that additional homes will be built in the near future. According to the Lindstrom zoning map, there are 39 lots planned for development within 300 feet of the transmission line. The transmission line will cross the northern edge of the CBD in the City of Lindstrom, but will avoid the main commercial district along U.S. Highway 8.

The route passes through land zoned for residential uses in Center City, although the current land use is commercial along U.S. Highway 8. The line avoids the central business district of Center City. In the City of Shafer, the route passes through land annexed in 2003 that is zoned for medium-density single-family residential uses. Approximately 12 to 15 new homes are within 150 feet of the existing transmission line in this newly-annexed segment of Shafer. Grading has occurred for more homes so it is likely that several more houses will be within 100 to 300 feet of the transmission line.

In Taylors Falls, the route passes through land zoned for agricultural-residential, single-family residential, single and two-family residential and shoreland. As it crosses the St. Croix River, the route passes through the St. Croix Scenic River District (SCR-1). This district corresponds to the National Park Service Scenic Riverway boundary; land use in this district is generally scenic and recreational. The route passes along the northern edge of the Taylors Falls Central Business District.

4.2.2.1 General Impacts

The route minimizes impacts to existing land uses by following existing transmission ROW for approximately 97 percent of its length. The rebuild segments of the line will not affect existing or proposed land uses. Impacts to Agricultural resources are described in Section 4.3.1.1.

Additionally, approximately 0.32 acres of land zoned Rural Residential I will be impacted due to the expansion of Lindstrom Substation. However, the Project should not affect future land use in the vicinity of the expansion due to limitations for any residential development in this area.

The route is adjacent to areas of new development around Lindstrom and Shafer City. Impacts to these new developments are expected to be minimal because the line is adjacent to roadways through these areas, and will be rebuilt along existing transmission ROW.

Burying the transmission line and reducing the number of wires crossing the river will not negatively impact land uses in Taylors Falls and will likely improve the scenic river district land use by improving the viewshed.

4.2.2.2 Mitigative Measures

In general, the rebuild portions of the line will not impact existing or proposed land use; therefore, no mitigation is necessary. Xcel Energy will work with Chisago County, City staff and business owners to ensure that impacts to land use from the construction of the line are minimized and addressed.

4.2.3 DISPLACEMENT

Chisago County is growing rapidly, and has a number of new housing developments along the proposed route, the largest of which are located along CSAH 19 and County Road 82. These homes are primarily single-family, and many of the developments have not completed construction.

There are approximately 212 homes within 300 feet of the transmission line ROW. In addition, there is one school and church in the City of Lindstrom within 100 feet of the transmission line.

4.2.3.1 Potential Impacts

The HVTL route is planned to minimize impacts on residents and businesses by utilizing existing ROW for 97 percent of its length. Displacement of a business or home would occur only if the final location of the transmission line would be too close to a building and NESC requirements would necessitate relocating it. There is no structure along the route of this Project that would require relocation. Displacement of residential homes or businesses is not anticipated.

4.2.3.2 Mitigative Measures

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

4.2.4 NOISE

Noise is comprised of a variety of sounds of different intensities, across the entire frequency spectrum. Humans perceive sound when sound pressure waves encounter the auditory components in the ear. These components convert these pressure waves into perceivable sound. Transmission conductors and transformers at substations produce noise under certain conditions. The level of noise or its loudness depends on conductor conditions, voltage level and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of the electricity ionizing the moist air near the wires. During heavy rain, the general background noise level is usually greater than the noise from a transmission line. In addition, very few people are out near the transmission line. For these reasons, audible noise is not noticeable

during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, the transmission lines will produce audible noise higher than rural background levels but similar to household background levels. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

4.2.4.1 Potential Impacts

Noise levels produced by 115 kV and 161 kV transmission lines and substations are usually not audible and have not been demonstrated to approach even the most stringent state standards. Additionally, the majority of the Project is located adjacent to roadways, and traffic noise would overpower any Project-related noise emissions. Noise impacts from the Project are not anticipated.

4.2.4.2 Mitigative Measures

No additional mitigative measures are necessary because there will be no noise impacts from the transmission lines and substations.

4.2.5 AESTHETICS

The proposed transmission line follows an existing line through cultivated lands, several areas of forested land, and numerous areas of open water and wetlands. The proposed transmission line also passes through the cities of Center City, Shafer and Taylors Falls as well as the central business district of Lindstrom.

The upper part of the St. Croix River (north of the St. Croix Falls dam) was one of eight inaugural rivers that gained protection under the Wild and Scenic Rivers (WSR) Act (P.L. 90-542) in 1968. Congress added the Lower St. Croix to the National WSR Program in 1972. Together, these two portions of the river are considered the St. Croix National Scenic Riverway (Riverway). The St. Croix River's scenic and recreational qualities are one of the primary factors in its inclusion in the WSR Act. The WSR Act requires management agencies to protect and enhance the values that caused them to be eligible for inclusion in the National Wild and Scenic Rivers System. The National Park Service (NPS) manages the Upper Riverway and the NPS, Minnesota Department of Natural Resources (MnDNR) and Wisconsin DNR jointly manage the Lower Riverway. The Lower St. Croix River is protected in Minnesota under the WSR Act of 1968 and the Minnesota Wild and Scenic Rivers Act, specifically the Lower St. Croix Wild and Scenic River Act (Minnesota Statutes § 103F.351) The route crosses the Lower St. Croix Riverway, and the river is managed as a recreational river at this point.

4.2.5.1 Potential Impacts

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

The Project must descend the west bluff and cross the St. Croix River to reach the St. Croix Falls Substation. The proposed crossing is located at the Xcel Energy St. Croix Falls Hydroelectric Plant between the cities of Taylors Falls and St. Croix Falls. There is currently one 69 kV transmission line and three overhead distribution lines that cross the river at this location. An existing 34.5 kV line which crossed above the hydroelectric plan was removed five years ago.

Minnesota Rule 4400.3350 prohibits the routing of an HVTL through state or national parks and state Scientific Natural Areas unless the HVTL would not "materially damage or impair the purpose for which the area was designated and no feasible and prudent alternative exists." Although it is administered by the NPS and the MnDNR, the Riverway is not a state or national park. Additionally, impacts to the visual character of the St. Croix River will be avoided by utilizing an existing crossing location and reducing the number of lines crossing the river. No structures will be placed in the River, and no construction will occur within the river.

4.2.5.2 Mitigative Measures

When it is appropriate, self supporting steel poles will be used to minimize the use of guy wires. To minimize visual impacts to forests and open spaces, wooden poles will be used where feasible.

Additionally, the viewshed will be improved by the fact that the transmission line will be buried from the top of the west bluff to TH 95. There are currently two parallel cleared corridors approximately 100 feet apart that cut through the wooded bluff slope. The existing transmission and distribution lines sharing the southern cleared corridor will be removed, allowing the tree canopy to completely fill in the southern cut. The northern, narrower cut corridor contains a double circuit distribution line. The Project would also remove these structures. A corridor free of trees will still need to be maintained at ground level above the buried transmission line along the northern corridor. Completely filling in the large southern cut corridor and removing the existing overhead transmission and distribution structures from both corridors would improve the visual continuity of the western bluff.

In the City of Lindstrom, the existing transmission line poles also carry distribution, phone lines and other utilities. The Project involves replacing the existing 69 kV line using steel poles and longer spans thus eliminating 5 of the 12 poles in the downtown area. Xcel Energy has initiated discussion with the City of Lindstrom regarding aesthetic considerations for the portion of the route that passes through the City. Construction of the new transmission line structures in Lindstrom could include aesthetic enhancements such as removing existing distribution service lines where feasible, underground distribution service lines or underground compatible designs that would allow the City to eventually place most or all of the distribution service lines underground. The long-term vision of this proposal is a less cluttered appearance of fewer poles carrying fewer wires. This would limit visual impact to the business district and residences along this ROW. Section 5.1.1 discusses Xcel Energy's coordination with the City of Lindstrom.

4.2.6 SOCIOECONOMIC

Table 4-3 summarizes 1990 and 2000 Census data and population estimates for 2005 for Chisago County and cities within the Project area. The population of Chisago County grew by 61.9 percent between 1990 and 2005; faster than the growth in Minnesota (19 percent) or the seven counties comprising the Metropolitan Council (22.8 percent). Much of the population and economic growth in the Project area is concentrated in the Lindstrom area. The cities in this township serve as bedroom communities to the Minneapolis-St. Paul metropolitan area. Population in the region is expected to grow in the future, primarily as a result of in-migration.

Table 4-3
Population and Economic Characteristics

Location	1990 Population	2000 Population	2005 Population Estimate	Percentage Growth 1990-2005	2000 Median Household Income	2000 Percentage of Population Below Poverty Level
Chisago County	**30,521**	**41,101**	**49,417**	**61.9**	**$52,012**	**5.1**
City of Center City	451	658	630	39.7	$48,594	5.5
City of Lindstrom	2,461	3,092	3,923	59.4	$44,980	8.0
City of Shafer	368	350	794	115.8	$41,667	9.1
City of Taylors Falls	694	917	1,051	51.4	$35,250	20.0
State of Minnesota	**4,375,099**	**4,919,479**	**5,132,799**	**17.3**	**$47,111**	**7.9**

Source: 2000 U.S. Census: General Demographic Characteristics

According to the 2000 Census race demographics, Chisago County is 96.7 percent white. Other minority groups in the area constitute a very small percentage of the total population. This trend is consistent throughout the cities in the Project area. Within Chisago County, approximately 5.1 percent of the population was identified as being below poverty level in the 2000 Census. The median household income within the Project area is generally similar to the median income of the state of Minnesota. With the exception of Taylors Falls, less than 10 percent of all individuals in the cities within the Project area are considered below poverty level. Taylors Falls has approximately 20 percent of its population below poverty level. There are no areas within the City that are comprised of primarily low-income housing. These individuals tend to be scattered throughout the City.

Traditionally, the economy of the region has been dependent on the timber industry. There was dramatic growth in the population at the turn of the century as a result of people migrating into the region to find employment in the timber industry. During the subsequent decades, the economy shifted to agriculture, primarily dairy operations. Agricultural operations are described in detail in Section 4.3.1. In recent years, there has also been significant growth in the services sector partially in response to the growth of recreation, tourism, and manufacturing and to serve the rapidly growing population. The economy in the region is diverse. The region is a destination for tourists, drawn by the abundance of outdoor recreational resources and the easy accessibility from the Minneapolis-St. Paul area. The proximity to the Twin Cities is a major factor affecting growth in the area.

4.2.6.1 Potential Impacts

Short-term impacts to socioeconomic resources will be relatively minor. The construction, operation and maintenance of the transmission line will not have a significant effect on agricultural operations. Xcel Energy has calculated that approximately 4.1 acres will be permanently removed from agricultural production. Project construction will not cause permanent impacts to leading industries within the Project area.

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

Table 4-4
Estimated Number of Workers for Construction

Type of Work	Number of Employees
Right-of-Way	1
Survey	2
Construction-Foundations	6-8
Construction-Poles	12-15
Construction-Substation	10-20
Construction – Underground duct work and manholes	4-6
Constuction – Cable Pulling (underground segment)	6-10
Underground cable termination	4
Office Personnel	4 (Infrequent visits)

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

If local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers in Chisago County will contribute to the total personal income of the region. Additional personal income will be generated for residents in the county and the state by circulation and recirculation of dollars paid out by the applicants as business expenditures and state and local taxes.

Expenditures made for equipment, energy, fuel, operating supplies and other products and services will benefit businesses in the counties and the state. Indirect impact may occur through the increased capability of the applicants to supply energy to commercial and industrial users, which will contribute to the economic growth of the region.

There is no indication that any minority or low-income population is concentrated in any one area of the Project, or that the transmission line will cross through an area occupied primarily by any minority group.

4.2.6.2 Mitigative Measures

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

4.2.7 CULTURAL VALUES

Cultural values include those perceived community beliefs or attitudes in a given area which provide a framework for each social group's unity. The cultural values of the Project area can be described in terms of how local residents view the land they live on and their approach to dealing with issues that they perceive will affect their lifestyles. The environment and the land can be valued for different reasons, including natural, scenic, cultural, historical and aesthetic. All are valid reasons to value a setting.

The values held by the inhabitants of the Project area are typical for rural settings and include self-sufficiency, independence and utilitarian land use. The area has a strong Swedish immigrant heritage. Pride in this heritage is shown through local heritage festivals, gift shops and memorials to the early settlers of the region. Presumably, the current residents in the area share many of the same attitudes towards the environment as their predecessors. The natural amenities that drew Swedish immigrants to the area are highly valued even today, as the local economy is still primarily based on agriculture. Though the local urban centers strive to retain a small town feel, the rural feel of the area has been changing, as there has been a sharp rise in population growth in recent years. As the demographic profile of the area changes, so too will local values. It is likely however, that these changes will not be significant, as people are moving into the region for similar reasons as their forebears, i.e. its natural, scenic and aesthetic qualities.

An example of how local cultural values can affect development in the region can be seen by the formation of the citizen's group "Concerned River Valley Citizens," a group that has previously opposed Xcel Energy's construction of a 230 kV line across the St. Croix River. The presence of this group indicates that area residents have strong feelings about the natural and scenic qualities of the St. Croix River Valley and impacts on it.

4.2.7.1 Potential Impacts

The construction of the transmission facilities will serve the region with a stable power supply. As the urban centers of the region continue to grow, and the diverse economic base continues to expand, the available power supplied by upgraded and additional facilities will likely encourage this development and afford the residents a stable economic environment in which to live and work. In addition, the opportunities presented by the diverse economy may continue to encourage civic pride; tourism may benefit from this unity as well.

Although the proposed transmission line will represent a change in structure types for Segments 2 through 6, these changes will not result in an adverse impact to the existing cultural values of the area because the line will follow existing transmission ROW. Burying a portion of the line through Taylors Falls will likely be seen as a benefit to the cultural value of the area. Additionally, minimizing the number of lines crossing the river will likely be regarded as a positive response to the cultural values expressed by groups such as the Concerned River Valley Citizens.

4.2.7.2 Mitigative Measures

The number of poles necessary for the new line will be less than or equal to current conditions in populated and sensitive areas. The number of poles will be limited to the minimum allowable for these types of transmission lines. Because no adverse impacts to cultural values are anticipated, no other mitigation is necessary or proposed.

4.2.8 RECREATION

Recreational opportunities in Chisago County include hiking, biking, canoeing, boating, fishing, camping, equestrian riding, swimming, hunting, snowmobiling and nature observation. Appendix C depicts the locations of recreation and wildlife areas near the Project area.

Three large recreational areas exist along the transmission line corridor. Carlos Avery Wildlife Management Area (WMA), Interstate State Park, and the St. Croix National Scenic Riverway are all public lands managed for a variety of outdoor recreational activities.

The transmission line in Segment 1 of the Project runs adjacent to the Carlos Avery WMA in Sections 12 and 13, Township 34 North, Range 21 West. WMAs are primarily managed to provide wildlife habitat, improve wildlife production and provide public hunting and trapping opportunities along with various other outdoor recreational opportunities. These MnDNR lands were acquired and developed with state funding, primarily from hunting and license fees. There are several rare, threatened and endangered species on the property. Carlos Avery WMA has an education and research facility called the Wildlife Science Center.

Interstate State Park, located just south of Taylors Falls, is also near the Project area of the transmission line. Interstate State Park, which was founded in 1895, is administered by the MnDNR

and offers year-round outdoor recreational opportunities involving camping, fishing, sightseeing, rock climbing and tours of the park. The route of the transmission line will run approximately 1,000 feet north of Interstate State Park at the closest point and will not cross or impede on any park boundaries.

The proposed route runs adjacent to Cherry Hill Park, a city park in Taylors Falls. The park consists of an open lawn and a small rink that is likely used for ice skating in the winter.

Section 4.2.5 discusses the St. Croix National Scenic Riverway. Recreationalists use the river for canoeing, fishing, and riverboat rides.

Segment 1 of the route crosses one snowmobile trail at three separate points, Segment 4 crosses two snowmobile trails and Segment 5 crosses one snowmobile trail. No Nature Conservancy Preserves, state Scientific and Natural Areas (SNA), or state and regional trails are within the immediate vicinity of the Project area.

4.2.8.1 Potential Impacts

Visual impacts will be the only potential impact to the aforementioned public lands. No impact will be evident to outdoor recreationalists using the northeast portion of Carlos Avery WMA, specifically along the Sunrise River before its confluence with the North Pool, since no construction is necessary along this portion of the proposed route. No impacts to snowmobilers are expected. The six points where the route crosses snowmobile trails are along rebuild portions; the change in structure type would not have an effect on the snowmobilers' recreational experience. At the closest point, a snowmobile trail passes approximately 0.3 miles from the proposed new Lawrence Creek Substation. Although the substation may be visible from the trail, it is not expected to discernibly change the view for snowmobilers. Due to the distance between the proposed transmission line route and Interstate State Park, there should be no visual impact from the Project on the park. The undergrounding of the line adjacent to Cherry Hill Park will result in a beneficial change to the view from this City Park. There should also be minimal visual impact to recreationalists from the transmission line crossing at the St. Croix River, as described in Section 4.2.5.2

4.2.8.2 Mitigative Measures

The transmission line will not impact any new areas not already affected by transmission lines along designated public lands and therefore no mitigation is necessary or proposed.

4.2.9 PUBLIC SERVICES

There are four cities with public services that are within the transmission line ROW. Public services available to these communities include police and fire (full-time and volunteer) departments, EMT and local government services. There are underground local utility lines in the vicinity of the

proposed buried portion of the transmission line. The Project area also is served by several television and radio providers.

According to Mn/DOT's 2005 Chisago County Traffic Map, TH 95 and U.S. Highway 8 carry the highest traffic volumes in the Project area (approximately 2,750 Annual Average Daily Traffic (AADT) and 7,800 to 18,500 AADT, respectively). CSAHs and County Roads in the Project area carry lower volumes, generally below 2,000 AADT. The relatively high density of large lakes in the Project area limits the number of east-west through corridors; U.S. Highway 8 is the only east-west road through both Central and Lindstrom Lakes. CSAH 19 also provides an important east-west travel corridor.

4.2.9.1 Potential Impacts

No impacts are anticipated to public services in the Project area. Existing utilities can impose constraints on the location of the buried portion transmission line. Xcel Energy will coordinate with local utilities (Taylors Falls public works, phone service, cable service, etc.) in order to determine which utilities are present. Gopher State One Call will be contacted prior to any construction in the buried section of the transmission line to mark any existing buried lines in order to avoid impacting these utilities.

Construction equipment to rebuild the existing transmission lines within the Project area would require an access path approximately 20 feet wide within the ROW or short spur trails from the existing road network to the ROW. Temporary guard structures would be used to string conductor over existing roads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height to avoid impacts to traffic. There may be temporary traffic impacts associated with equipment and material delivery and worker transportation.

In the cities along the route, particularly in the constrained portions of downtown Lindstrom, construction of the transmission line may temporarily impact use of streets. Impacts could result from construction vehicles and safety perimeters temporarily blocking public access to streets and businesses.

Access to modify the existing substations would be from existing roads and would only cause minor and temporary disruption to traffic.

It is estimated that the Project would require approximately 30 to 40 full-time employees devoted to transmission line construction and 10 to 20 employees for substation modifications. The numbers of employees working on the Project would vary based on which phase is being constructed, and would be less than the total numbers listed above. Part-time personnel may also be needed. Given the small number of workers and construction vehicles, traffic disruptions would be minimal and localized.

If the transmission line is buried beneath public roadways, traffic would still be able to use the roads by utilizing flagmen for controlled lane closure. Any required temporary lane closures would be coordinated with the local jurisdictions, and would provide for safe access of police, fire and other rescue vehicles. If trenching is necessary through TH 95, Xcel Energy will coordinate with Mn/DOT to determine the best way to minimize impacts.

After the implementation of the standard and additional mitigation measures, the rebuild of the transmission lines and modifications to substations would involve short term localized traffic delays. The impacts resulting from construction and operation of the transmission lines and modifications to substations are not anticipated to affect regional traffic, and will only impact traffic on a short-term, localized basis.

Corona from transmission line conductors can generate electromagnetic "noise" at the frequencies at which 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. AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the ROW to either side. FM radio receivers usually do not pick up interference from transmission lines.

4.2.9.2 Mitigative Measures

No impacts to public services are anticipated, and therefore no mitigation is necessary. Impacts to transportation would be localized and short term. Conductors and overhead wire stringing operations would use guard structures to eliminate delays. When appropriate, pilot vehicles will accompany the movement of heavy equipment. Traffic control barriers and warning devices will be used when appropriate. All necessary provisions will be made to conform to safety requirements for maintaining the flow of public traffic. Construction operations will be conducted to offer the least possible obstruction and inconvenience to public traffic. The construction contractor would be required to plan and execute delivery of heavy equipment in such a manner that would avoid traffic congestion and reduce the likelihood of dangerous situations along local roadways. Xcel energy will work closely with Mn/DOT, the county and municipalities along the route in order to minimize disruption to area traffic. Possible mitigation measures to minimize impacts to roadways, including TH 95, could include closing only one lane at a time, and constructing in off-peak hours.

Although radio and television interference sometimes occurs, Xcel Energy investigates all such problems and corrects those problems caused by Xcel Energy facilities. Xcel Energy does not expect that there will be any impacts from the operation of the new line.

4.3 LAND-BASED ECONOMICS

4.3.1 AGRICULTURE

Chisago County has a strong agricultural base. In 2002, the number of farms in Chisago County was 943, of which 457 were farms with operators that farmed as their principal occupation. The median size of farms in Chisago County is 76 acres. According to the United States Department of Agriculture (USDA) 2002 Census of Agriculture, the largest crops by acreage were corn and soybeans; in addition these farms produce a variety of agricultural products including oats, hay, beef and dairy cattle, swine, sheep, vegetables and other harvested crops. The average value of sales per farm decreased by approximately 17 percent between 1997 and 2002. Appendix G.3 lists the percentages of the route that are in agricultural uses.

4.3.1.1 Potential Impacts

No long-term impacts are anticipated to the agricultural economy for the Project. During construction, temporary impacts such as soil compaction and crop damages within the ROW may occur. There will be some permanent impacts to farmland throughout the Project area associated with pole placement and substation expansion. The impacts due to pole placement will be minimal, with the majority of the temporary permanent impacts related to the construction of the new Lawrence Creek Substation. Temporary impacts to agricultural land due to the substation and new alignments are estimated to be 4.4 acres. Permanent impacts to agricultural lands are estimated at 4.1 acres for the substation and less than 0.01 acres for the transmission line. Of this, approximately 3.3 acres would be prime farmland, and approximately 0.48 acres would be prime farmland when drained. This small loss of land is not expected to affect the overall agricultural land uses in Chisago County.

Appendix G describes the agricultural impacts for the route in more detail.

4.3.1.2 Mitigative Measures

By following existing ROW for the majority of the line, Xcel Energy has attempted to minimize impacts from the Project to agricultural and other land uses. When possible, Xcel Energy will construct the Project before crops are planted; otherwise Xcel Energy will compensate landowners for crop damage and soil compaction that occurs as a result of the Project. Soil compaction will be addressed by compensating the farmer to repair the ground or by using contractors to come in and chisel plow the site.

4.3.2 FORESTRY

Historically, Chisago County has developed an economically viable forestry industry, although there are no managed forestry resources crossed by the Project.

4.3.2.1 Potential Impacts

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

Because the route follows existing ROW for 97 percent of its length, clearing of trees will be minimal. Impacts to forested areas and shelterbelts along the rebuild portion of the route will be incidental, and will be limited to the amount necessary to permit safe and reliable operation of the transmission line. Due to safety concerns, any trees that would grow taller than 15 feet within the ROW will need to be removed beneath overhead lines. Additionally, a 10-foot radius around each structure will be kept free of woody vegetation. The area above the buried section of transmission line in Taylors Falls will need to be kept cleared of large trees. Approximately 0.25 acres of trees along a narrow steep slope east of the Lawrence Creek Substation will be impacted as a result of the new 161 kV line alignment. The wooded slope extends both north and south of the substation, so impacts are unavoidable.

4.3.2.2 Mitigative Measures

Construction staging areas will be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. The area will be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation and provide for proper drainage and prevent erosion.

Clearing for access roads will be limited to only those trees necessary to permit the passage of equipment. Temporary access roads will be restored to native vegetation. Native shrubs that will not interfere with the safe operation of the transmission line will be allowed to reestablish in the ROW. However, vegetation that may interfere with the construction, operation or maintenance of the transmission line will be removed.

4.3.3 TOURISM

Tourism in Chisago County is centered around the County's lakes and rivers and other outdoor recreational opportunities. Outdoor recreation is discussed in detail above in Section 4.2.8. In Taylors Falls, many tourist attractions are connected to the St. Croix River. These include boat tours, boat rental and events such as a kayaking rodeo and fishing contests. Wild Mountain Ski Area and Water Park is located north of Taylors Falls. Historic sites in Taylors Falls include Folsom House and the 1852 Town House School. Franconia Sculpture Park is located west of Taylors Falls in Shafer. Other attractions in the Taylors Falls area include antique stores, art galleries, private campgrounds and miniature golf.

Tourist attractions near Lindstrom, Center City and Shafer that use the area lakes include fishing, boating, resorts and private campgrounds. The area hosts a variety of community celebrations and events. Other attractions include art galleries, antique stores and golfing.

4.3.3.1 Potential Impacts

Since the new transmission line will be built in the existing ROW, there will not be additional visual impacts. These poles may become more visible during construction in the cities of Lindstrom and Center City; however, these impacts are temporary. The consolidation of transmission lines crossing the St. Croix River as well as the burying of a segment of the line through Taylors Falls will generally benefit the visual draw of the area. No additional impacts to area tourism are anticipated.

4.3.3.2 Mitigative Measures

No mitigation will be required since no impacts are anticipated to area tourist attractions.

4.3.4 MINING

According to the Division of Land and Minerals (DLM) of the MnDNR, there are no mineral mines or areas of potential mineral mines in Chisago County. There are many aggregate mining operations (gravel and sand pits) within the county. According to the DLM, the transmission line does not cross active aggregate mining operations. In the Project area there are both current aggregate mining operations and potential resources along the Sunrise and St. Croix rivers. The quality of the aggregate near where the Project crosses the Sunrise River is classified as "less desirable sand and gravel deposits." The transmission line crosses areas of "highly to moderately desirable bedrock deposits," "highly desirable sand and gravel deposits," "moderately desirable sand and gravel deposits" and "less desirable sand and gravel deposits" near Taylors Falls.

4.3.4.1 Potential Impacts

Since there are no mineral mining or "known but undeveloped resources" in Chisago County, the Project has no potential impact on mineral mines.

The transmission line would not adversely impact active sand and gravel mining operations in the County. The impact along the transmission line would be limited to the footings of the power poles, restricted excavation access in the vicinity of the transmission lines, and the boring for the underground portion of the Project near Taylors Falls. Additionally, the Project would be constructed in the existing ROW and the number of transmission line poles may be reduced. Any potential aggregate resources in the ROW would have already been impacted in terms of their availability for development. Therefore, there would be no additional impacts on potential aggregate resources in the Project area.

4.3.4.2 Mitigative Measures

Because no impacts are anticipated, no mitigation is required.

4.4 ARCHAEOLOGICAL AND HISTORIC RESOURCES

During the Project's pre-planning phase (prior to federal agency involvement), the Minnesota State Historic Preservation Office (SHPO) was contacted to solicit comment regarding the potential need for cultural resource surveys. The U.S. Army Corps of Engineers (COE) was later identified as the lead federal agency for the proposed St. Croix River crossing.

4.4.1 PREVIOUSLY IDENTIFIED SITES

A search of the SHPO database was conducted in order to identify previously-documented sites within one mile of the Project. A radius of one mile was used in order to determine the types of archaeological and historic resources, both identified and unidentified, that are likely to be found in the area that could be affected by the Project. The search identified three historic districts, 164 historic standing structures, one cemetery and 18 archaeological sites within one mile of the route segments. The historic standing structure sites include commercial buildings, government buildings, schools, churches, houses and barns. The archaeological sites include earthworks, artifact scatters and structural remains.

The following discussion focuses on those identified sites within 1,000 feet of the route segments, because more distant properties are not expected to be affected by the Project.

4.4.1.1 Segment 1

No cultural resources have been identified in Segment 1.

4.4.1.2 Segments 2 through 4

Multiple cultural resources have been identified in these segments. Archaeological sites include five sites containing mounds (earthworks) located within 1,000 feet of the Project along Segments 2 and 3. There are also three recorded sites that do not contain mounds within 1,000 feet of the Project area. Of the sites that contain mounds, three have apparently been destroyed by development, one site still contains a partial mound and one site consists of a nearly intact lone mound. The lone mound site is certified as eligible for the National Register of Historic Places (NRHP).

There is one artifact scatter in the Project area in a largely disturbed context that is within 350 feet of the Lindstrom Substation. There is also one Woodland-era artifact scatter that is certified as eligible for the NRHP within 350 feet of Segment 3; this site has been buried by fill for road construction. A remnant railroad grade located within 1,000 feet of Segment 3 was previously evaluated and recommended not eligible for the NRHP. NRHP status has not been determined for any of the remaining archeological sites other than the two mentioned above.

Standing Structures

Nineteen historic standing structures are located in downtown Lindstrom. These structures include a hotel, a gas station, a bank, a commercial building, a water tower, two churches and 12 houses. Three of the houses are listed in the NRHP. The NRHP eligibility status of the remaining properties has not been determined. All of the properties are located within 700 feet (both north and south) of the Project area. One additional site, a schoolhouse, is located within 700 feet north of Segment 3. Its NRHP eligibility has not been determined.

The Center City Historic District encompasses 20 standing structures (one church and 19 houses) along Summit Avenue in the downtown area, which is approximately 800 feet north of the Project at the closest point. An additional 44 buildings (houses, a garage, a grocery store, the county jail, telephone office, law office, bank, depot, a church, a motel and motel office, the Park Island Hotel, a cemetery, two commercial buildings and both the new and old County Courthouses) are located throughout the remainder of the City. Only the depot, which has not been evaluated for significance, is adjacent to the Project area (less than 350 feet north of Segment 3). The remaining buildings are located more than 350 feet north of the Project area.

4.4.1.3 Segments 5 and 6

Archaeological Sites

There is one lithic scatter (a site containing waste flakes associated with stone tool-making) located near the St. Croix Falls Power Plant that is within 1,000 feet of the Project area. The NRHP eligibility of the lithic scatter has not been determined.

Standing Structures

The John Artig Farmhouse is located adjacent to the Project area on Highway 82, and a section of the historic Point Douglas-Superior Military Road terminates at Highway 82 near where the transmission line angles to the northeast. Both of these properties are within 1,000 feet of the Project.

The Project is greater than 0.5 miles from 18 standing structures in downtown Taylors Falls, as well as the Angel's Hill Historic District in Taylors Falls. One inventoried structure, a pump house, is within 1,000 feet of the Project. Its NRHP eligibility has not been evaluated.

The St. Croix Falls Power Plant, the terminus for the transmission line in Wisconsin, has been recommended eligible for the NRHP.

4.4.2 UNEVALUATED PROPERTIES

The majority of the corridor has not been surveyed for archaeological properties. The 1888 and 1914 plat maps show numerous farmsteads and residences or other buildings within 350 feet of the

Project area. Many of these structures are also depicted on the Stacy (1974), Lindstrom (1974) and St. Croix Dalles (1978) USGS 7.5' topographic quadrangles. None of these have been evaluated for NRHP eligibility.

4.4.2.1 Potential Impacts

Archaeological Sites

Possible impacts to archaeological resources in the Project area include:

- Damage to surface soils throughout the Project area from heavy rubber-tread or metal-tracked vehicle operation.
- Subsurface excavations necessary to remove old wood power poles or install new metal poles.
- Damage to surface soils from dragging heavy objects (e.g., power poles).
- Damage to surface soils through grubbing, stump removal and grading.
- Excavation of borrow areas.

The identification of new archaeological sites is most likely to occur in Segments 5 and 6, where significant previous ground disturbance is likely to be relatively minimal.

Standing Structures

No physical impacts are anticipated to previously-identified historic standing structures in the Project area. Visual impacts to previously-identified historic properties are unlikely because 1) there is an existing transmission line along the corridor, 2) the Project will result in a net reduction in the number of poles, and 3) the new poles will be comparable in scale to the existing poles. The existing wood poles range from 61 to 70 feet in height. The steel poles proposed for the downtown area will range from 80 to 90 feet above ground. The proposed increase in structure height may be noticeable from historic or potentially historic properties that are directly adjacent to the route. The change would likely not be noticeable from properties greater than one block away. Because the route is a rebuild along the existing alignment, and because fewer structures will be located in Lindstrom when compared to existing conditions, it is not anticipated that the Project would negatively affect any historic properties. The removal or elimination of transmission structures may be viewed as a positive impact on historic resources.

Since the majority of the Project area has not been surveyed, unidentified historic standing structures may be present in the Project area. The COE may require such properties to be identified and evaluated as part of the Section 106 process.

4.4.2.2 Mitigative Measures

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

There may be impacts to unidentified archaeological properties in previously undisturbed portions of the Project area. Xcel Energy will work with the COE and SHPO during their review process to determine what areas may require surveys for the Project. Xcel Energy will carry out the appropriate field identification and/or construction monitoring.

There are no anticipated physical impacts to previously identified historic properties, and it is likely that physical impacts to any additional properties identified during corridor survey can be avoided. Visual impacts to identified and unidentified historic architectural properties are not anticipated.

4.5 NATURAL ENVIRONMENT

4.5.1 AIR QUALITY

There are minimal air quality impacts associated with transmission line construction and operation.

The only potential air emissions from a transmission line result from corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. For 115/115 kV double-circuit, 115 kV single-circuit and 161 kV single-circuit transmission lines, the conductor gradient surface is usually below the air breakdown level. Usually some imperfection, such as a scratch on the conductor or a water droplet, is necessary to cause corona. Ozone also forms naturally 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 and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short-lived. The Project area presently meets all federal air quality standards.

4.5.1.1 Potential Impacts

Currently, both state and federal governments have regulations regarding permissible concentrations of ozone and oxides of nitrogen. The national standard is 0.08 ppm on an eight-hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year. Calculations using the Bonneville Power Administration (BPA) Corona and Field Effects Program Version 3 (USDOE, BPA Undated) for a standard single-circuit 161 kV project, predicted the maximum concentration of 0.007 ppm near the conductor and 0.0003 ppm at

one meter above ground during foul weather or worst-case conditions (rain at 4 inches per hour). During a mist rain (rain at 0.01 inch per hour), the maximum concentrations decreased to 0.0003 ppm near the conductor and 0.0001 ppm at one meter above ground level. For both cases, these calculations of ozone levels are well below the federal and state standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there will be no impacts relating to ozone for the Project.

There will be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing during construction of the transmission line and substation. Temporary air quality impacts caused by the construction-related emissions are expected to occur during this phase of activity.

The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment will vary according to the phase of construction but will be minimal and temporary. Adverse impacts to the surrounding environment will be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

4.5.1.2 Mitigative Measures

There will be no significant impacts to air quality; therefore, no mitigation is necessary. Temporary impacts due to construction will be minimized by using Best Management Practices (BMPs) to reduce dust emissions.

4.5.2 WATER QUALITY

Surface Water

A determination of the surface water resources was conducted by reviewing the United States Geological Survey (USGS) 7.5-minute quadrangle, the National Wetland Inventory (NWI) map and the Public Waters Inventory (PWI) map.

The Project crosses an unnamed tributary to the Sunrise River, the Sunrise River, an unnamed Tributary to Center Lake, Lawrence Creek and an unnamed Tributary to Lawrence Creek. At a point near Taylors Falls, the transmission line will be installed underground, resurfacing at TH 95 west of the St. Croix River, which is a National Scenic Riverway. The Project will cross the St. Croix River at a point where existing transmission poles are located, replacing the existing structures. The route also passes near but does not cross North and South Lindstrom Lakes and North and South Center Lakes.

There are several wetlands and water bodies identified on the PWI maps for Chisago County (Appendix C). The following is a summary of the resources along the Project route identified on the PWI map as waters or wetlands.

Table 4-5
PWI Lakes and Wetlands within or adjacent to the Route

Name[1]	Location		
	Section(s)	Township	Range
Sunrise River	1, 13, 24	34	21
Sunrise Pool (59P)	13	34	21
Peterson Slough (60W)	12	34	21
North Lindstrom Lake (35P)	33	34	20
South Lindstrom Lake (28P)	32, 33	34	20
North Center Lake (32P)	34	34	20
South Center Lake (27P)	34, 35	34	20
Unnamed (106W)	33	34	20
Unnamed (155W)	32	34	20
Lawrence Creek	27, 34	34	19
St. Croix River	19, 24, 25, 30	34	19

[1]Public waters are identified with a number followed by a "P" (e.g., 85P) and the public waters wetlands are identified with a number followed by a "W" (e.g., 30W).

The transmission line will not cross any trout streams or outstanding resource value waters. Downstream (approximately 1.1 miles south) of the Project, Lawrence Creek is a designated trout stream near the St. Croix River.

Wetlands

The transmission line passes through or near several wetlands of varying sizes and characteristics. The vast majority are shallow wetlands less than 20 acres in size dominated by trees, shrubs and emergents. During an initial field survey conducted in October 2006, approximately 44 potential wetlands were identified as adjacent to or crossed by the existing transmission line. One potential wetland is located along the proposed 0.6 mile portion of the Project that is along new ROW, into and out of the new Lawrence substation. This wetland is located directly east of the proposed Lawrence Substation location. The site of the proposed Lawrence Substation does not appear to contain any wetlands. The area east of the existing Lindstrom Substation that would be affected by the expansion of the substation does not appear to be a wetland. Although the vegetation at this site contained reed canary grass (*Phalaris arundinacea*), the October 2006 field visit determined that no wetland hydrology or hydric soil characteristics occur at this site. The work at the Chisago and Shafer substations will not affect wetlands.

4.5.2.1 Potential Impacts

The Project proposes to replace an existing line with structures that have a similar footprint; therefore, the Project will not result in any substantial, permanent wetland impacts. Wherever feasible, existing poles that are in wetlands or lakes will be moved to uplands. There are approximately six wetlands that cannot be spanned due to structure limitations. Minimal temporary impacts to wetlands may occur from construction activities and access to the line. Minimal temporary impacts to wetlands may occur if these areas need to be crossed during construction of the transmission ROW. However, Xcel Energy will avoid crossing wetlands during construction to the greatest extent feasible.

During construction, there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading and construction traffic. Impacts should be negligible at the St. Croix River since the location of the Project follows existing lines. The Applicant would employ erosion control BMPs and adhere to the terms and conditions of the National Pollution Discharge Elimination System (NPDES) permits and Stormwater Pollution Prevention Plan (SWPPP) during construction to protect topsoil and adjacent water resources, and to minimize soil erosion and trap it before it reaches surface water resources

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

As discussed in Section 3.4.4, burying the transmission line from TH 95 to the St. Croix River was considered as an alternative to overhead lines. There is a large marsh between TH 95 and Chisago Street, with poles currently within its boundaries. Burying the transmission line through this section of the route would result in large temporary impacts to this wetland. Permanent impacts to this wetland could also occur as a result of burying the line if the integrity of the relatively shallow bedrock underlying it is affected, changing the drainage patterns and permeability. The proposed overhead line will be designed to minimize the number of structures within this wetland, likely reducing the number of poles when compared to existing conditions.

4.5.2.2 Mitigative Measures

Xcel Energy will maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored soil. Xcel Energy will avoid major disturbance of individual wetlands and drainage systems during construction. This will be done by spanning wetlands and drainage systems where possible. When

it is not possible to span the wetland, Xcel Energy will draw on several options during construction to minimize impacts:

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

4.5.3 FLORA

The land adjacent to the Project is cultivated (primarily soybean and corn) and developed land. A significant amount of the agricultural land along the route is currently being converted to residential developments. The Project lies in an area comprised of species typical of rural agricultural areas, as well as the northern hardwood forest and the deciduous forest tension zones. The native vegetation and forestry groups that occur in Chisago County include hardwood forests, grassland and coniferous bogs and swamps. The Project occurs in areas that were historically maple-basswood forests, northern floodplain forests, wet prairies and coniferous bogs and swamps.

There are many natural areas along the route that could potentially provide habitat for native species. The area near the Sunrise River and Carlos Avery WMA in Segment 1 provides a variety of habitats including riparian corridors, forests and a variety of wetland types. The lakes near Lindstrom are surrounded by development, limiting the diversity of plant species in this area. Plant diversity increases as the transmission line approaches the St. Croix River, where much of the route is forested, including an area of relatively high-quality maple-basswood forest (not listed on the MnDNR County Biological Survey) that is crossed by the existing 69 kV transmission line between the Lawrence Creek Substation and Taylors Falls. In the segment of the line proposed to be buried west of TH 95, there is a maple-basswood forest that is currently bisected by two transmission and distribution line corridors. This forest has also been impacted by the surrounding residential developments. Between Chisago Street and the St. Croix River, there is a segment of maple-basswood forest that is bisected by transmission lines, residential lots and city streets.

The maple-basswood forest system is described as an upland mesic forest that lies on glacial till or river bottomlands. Commonly known as the "Big Woods," these forest types are typically dominated by sugar maple (*Acer saccharum*) and basswood (*Tilia americana*). Within the Project area, the Minnesota County Biological Survey (MCBS) identifies a small stand of maple-basswood forest north of Interstate State Park along the St. Croix River. Additionally, the MnDNR identified an Oak Forest remnant near the Sunrise River and Carlos Avery WMA in their correspondence (Appendix H). This historically dominant wooded area has been largely converted to agricultural uses.

Wet prairies, sometimes referred to as marshes or sloughs, were historically scattered throughout Chisago County as well. Marsh grasses, rushes and sedges are common throughout these wet prairies. Herbaceous species that are commonly found in these wet, open areas range from lake sedge (*Carex lacustris*) and Canada bluejoint (*Calamagrostis canadensis*) to blue vervain (*Verbena hastata*) and giant goldenrod (*Solidago gigantea*). Today, there are very few documented areas of wet prairie within Chisago County, and what few do remain are primarily west of the Project area. Between TH 95 and Chisago Street, there is a deep marsh wetland vegetated with reed canary grass and cattails (*Typha* sp.). The wetland has been impacted by the adjacent roadways.

Appendix G identifies the land cover along the route; Appendix I identifies rare and unique vegetative resources in the Project area.

4.5.3.1 Potential Impacts

The majority of flora within habitats in the Project area is typical of what will be found in agricultural and urban settings. Since the Project will be built along the existing 69 kV transmission line ROW and no construction will be necessary in Segment 1 of the Project, no additional impacts are anticipated to native vegetation.

Permanent impacts will be minor since the transmission line will be constructed on an existing utility ROW. Additionally, no new ROW will be cleared in forested areas along the rebuild portions, resulting in minimal impacts to this resource. Temporary impacts may occur due to activities associated with pole construction, including minor vegetative clearing for excavation, leveling and heavy equipment traffic. Vegetative clearing would include felling trees along the existing transmission line route and temporarily trimming or removing any shrubs or tall grass. Similar to existing maintenance practices, trees that would grow to taller than 15 feet would be removed beneath the overhead lines. Additionally, approximately 0.25 acres of trees will be cleared along the ROW of the new 161 kV route just east of the proposed Lawrence Creek Substation. The trees in this area are along a steep, narrow ridgeline surrounded by cropped fields. Approximately 0.3 acres of vegetation will be impacted due to the expansion of the Lindstrom substation. The existing vegetation consists of Kentucky bluegrass (*Poa pratensis*) and reed canary grass.

Along the segment of the route proposed to be buried through the forested slope in Taylors Falls, there will be a corridor maintained to be free of large trees, corresponding to the existing northern corridor. The existing southern cleared corridor will be allowed to fill in with trees.

4.5.3.2 Mitigative Measures

During construction of the transmission line, impacts to forestry and vegetative resources will be avoided whenever possible. Xcel Energy intends to utilize the existing ROW where clearance requirements have been followed for many years. Xcel Energy will minimize tree felling and shrub removal near the St. Croix River by removing only trees that would impact the safe operation of the

facility. Additionally, Xcel Energy will maintain sound water and soil conservation practices during construction and operation of the Project to protect topsoil and adjacent water resources, and minimize soil erosion (See Water Quality in Section 4.5.2). Areas disturbed due to construction activities would be restored to pre-construction contours. In non-cultivated areas, reseeding would occur in a timely manner using a seed mix certified to be free of noxious weeds, if acceptable to the affected landowner.

4.5.4 FAUNA

Lands on the western and eastern edges of the Project provide habitat for many types of organisms. Expansive, diverse wetlands and oak forest remnants provide habitat for many types of amphibians, upland game, waterfowl, raptors, small mammals, and deer along Segment 1 of the Project. Most of the land adjacent to the route along Segments 2 through 5 is either developed or cultivated. Areas in Segments 2 through 5 that could potentially provide habitat for local species are near North and South Lindstrom Lakes, North and South Center Lakes and unnamed streams along the route. Fauna in these areas would be those organisms typically found in urban and agricultural settings such as deer, raccoon, passerines and raptors. Segment 6 is within Taylors Falls and ends at the St. Croix River. Fauna known to inhabit the St. Croix River area are white-tailed deer, skunks, raccoons, squirrels and a variety of birds, including bald eagles. The Five-lined Skink (*Eumeces fasciatus*) is a species of special concern and has been documented in Section 25, Township 34N, Range 19W, near the St. Croix River. Section 4.6 of this document discusses this species in greater detail.

The Carlos Avery WMA is located adjacent to Segment 1 of the proposed route. WMAs are managed for wildlife production and are open to hunting and wildlife watching. Carlos Avery allows trapping with permits, deer hunting in designated areas for individuals with disabilities and wild turkey hunting during the spring in designated areas. There are several rare or endangered species in the Carlos Avery WMA, including several freshwater mussels and Blanding's turtle (*Emydoidea blandingii*). Sandhill Cranes (*Grus canadensis*) are also known to inhabit the WMA. Appendix I lists the rare animal species in the Project area.

4.5.4.1 Potential Impacts

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife inhabiting the Carlos Avery WMA will not be affected because no construction will occur in this segment. Wildlife that inhabits natural areas such as near the St. Croix River could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Impacts to wildlife are anticipated to be short-term since the route primarily will be constructed along an existing transmission line ROW, and the amount of grading and clearing required is minimal. Additionally, the animals in the areas where new construction will occur (primarily the Lawrence Creek Substation) will be typical of those found in agricultural and urban settings. The new construction should not affect these animals because

rural agricultural habitat would remain in the immediate vicinity. Impacts to the wooded areas near the St. Croix River and along the Project route will be avoided when possible.

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

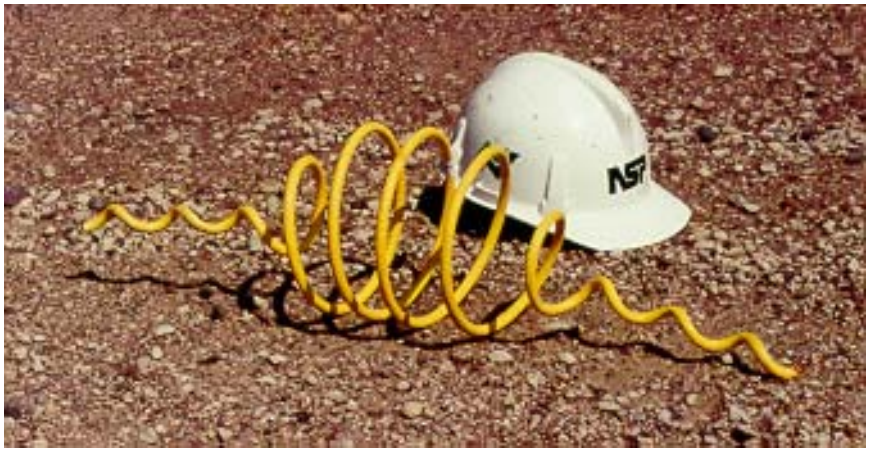
Additionally, large birds, such as raptors, could potentially be impacted by the new transmission lines through electrocution. Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. However, Xcel Energy transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution.

4.5.4.2 Mitigative Measures

Xcel Energy has been working with various state and federal agencies over the past 20 years to address avian issues. Company personnel work to address problem areas as quickly and efficiently as possible. In 2002, Xcel Energy Inc.'s operating companies entered into a voluntary memorandum of understanding (MOU) to work together to address avian issues through its territory. This includes the development of Avian Protection Plans (APP) for each state Xcel Energy Inc. serves. Currently, Public Service of Colorado is finalizing the APP for Colorado and will begin work on the Minnesota and Wisconsin APPs. Standard reporting methods were also developed. As part of the APP, the Project would be examined for collision risks, and if a potential risk was identified, mitigation procedures would be recommended.

In cooperation with the MnDNR and the United States Fish and Wildlife Service (USFWS), Xcel Energy will identify areas where installation of swan flight diverters on the shield wire may be warranted. Xcel Energy will also coordinate with the NPS on any recommendations that agency may have for avian issues at the St. Croix River crossing. In most cases, the shield wire of an overhead transmission line is the most difficult part of the structure for the bird to see. Xcel Energy has had success in reducing collisions on transmission lines by marking the shield wires with swan flight diverters (SFD). SFDs are pre-formed spiral shaped devices made of polyvinyl chloride that are wrapped around the shield wire (Figure 4-1).

Figure 4-1
Swan Flight Diverter



The relatively low profile of the proposed structures between TH 95 and the St. Croix River, as well as the consolidation of lines crossing the river, will further minimize the potential for avian collisions.

Section 4.6.2 details mitigative measures designed to avoid and minimize impacts to rare and unique animal species.

4.6 RARE AND UNIQUE NATURAL RESOURCES

Appendix I is a summary list of 124 occurrences of rare or unique resources identified within one mile of the Project area. These resources were identified using the MnDNR Natural Heritage Database. These resources include two federally- and state-endangered mussels (Higgins and eye [*Lampsilis higginsi*] and winged mapleleaf [*Quadrula fragosa*]); the federally-threatened, state special concern bald eagle (*Haliaeetus leucocephalus*); the federal candidate, state-threatened spectaclecase mussel (*Cumberlandia monodonta*); three state-endangered species (ebonyshell mussel [*Fusconaia ebena*], wartyback mussel [*Quadrula nodulata*], and rough-seeded fameflower [*Talinum rugospermum*]); 10 state-threatened species (nine mussel species and Blanding's turtle [*Emydoidea blandingii*]; 16 state special concern species (four fish species, four mussel species, two bird species, two reptile species, three plant species and one lichen); 11 non-listed species for which the MnDNR is gathering data for possible future listing; five freshwater mussel concentration areas; two natural communities (a rock outcrop and a maple-basswood forest); six types of unique geologic areas; and a historical (1940) record of the state-threatened peregrine falcon [*Falco peregrinus*]).

Additionally, MCBS data was consulted to determine if there were areas with medium, high or outstanding biodiversity significance along the proposed route. Areas with medium biodiversity significance are those containing significant occurrences of rare species and/or moderately-disturbed native plant communities and landscape that have a strong potential for recovery. Areas with high

biodiversity significance contain sites with very good quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species, the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota. The route crosses one area with medium biodiversity significance, associated with the Carlos Avery WMA. There is also an area of high biodiversity significance associated with Interstate State Park, approximately a quarter mile from the proposed route.

In their correspondence, the MnDNR highlighted four resources that may be impacted by the Project, identifying ways Xcel Energy could avoid impacting these resources: an Oak Forest Natural Community, several freshwater mussel species, Blanding's turtle and the five-lined skink (*Eumeces fasciatus*). The Oak Forest community is associated with the Carlos Avery WMA. The mussel species are located in the Sunrise and St. Croix rivers. Documented Blanding's turtle occurrences are scattered throughout the Project area; there is also an area that the MnDNR considers to be of statewide importance for the turtle near Carlos Avery WMA in Segment 1. The five-lined skink was documented in the vicinity of Segment 6.

In their correspondence, the USFWS identified three federally threatened or endangered species in the Project area. Two of the species are freshwater mussels that were documented in the St. Croix River. Both the winged mapleleaf and the Higgins' eye pearly mussel are federally endangered species. The USFWS also identified a bald eagle nest southeast of Center City. The bald eagle is a federally threatened species.

Section 4.2.5 discusses the unique features of the St. Croix Riverway.

4.6.1 POTENTIAL IMPACTS

In general, impacts to rare and unique natural resources will be avoided because the Project is a rebuild of an existing line along 97 percent of the route. The area of new construction associated with the proposed Lawrence Creek Substation would occur in an agricultural area where native species are not likely to occur. The USFWS concluded that, "Given the location and type of activity proposed, we have determined that the Project is not likely to adversely affect the bald eagle, the winged mapleleaf mussel or the Higgins' eye pearly mussel" (Appendix H.1).

Natural Communities - Oak Forest, Maple-Basswood Forest and Rock Outcrop

Impacts to the Oak Forest natural community referenced in the MnDNR correspondence are not anticipated. This natural community is located in Segment 1, where no construction will occur for the upgrade. The maple-basswood forest and rock outcrop communities are both located in Interstate State Park. The proposed route of the transmission line will run approximately 1,000 feet north of Interstate State Park at the closest point. No impacts to natural communities in this park are anticipated.

Bald Eagle

The bald eagle nest identified southeast of Center City (Appendix H) is approximately 0.8 miles from the Project area. No impacts are anticipated.

Mussels

Freshwater mussels were identified in the Sunrise River and the St. Croix River by the MnDNR and USFWS. No impacts are anticipated to the mussels in Sunrise River because no construction will occur in this Segment. The closest documented occurrences of mussels and mussel concentration areas are approximately 0.85 miles downstream of the proposed crossing area. Impacts to these species will be avoided by using BMPs to prevent sediment from entering the river.

Fish

State-listed fish species are documented within the St. Croix River downstream of the proposed river crossing. No direct impacts to these species' spawning areas will result from the Project because no construction will occur within the river. Indirect impacts will be avoided by using BMPs to prevent sediment from entering the river.

Five-lined Skink

In Minnesota, five-lined skinks are generally found in wooded ravines with areas of exposed bedrock. The MnDNR expressed concern over potential impacts to this species in the Taylors Falls area where the transmission line will be buried. Temporary impacts to this species could occur during construction, which could temporarily displace any skinks inhabiting the existing transmission corridor. It is estimated that temporary impacts would consist of an approximately 50-foot wide corridor along the existing 69 kV route. Construction activities would include trenching, storing excavated soil and heavy truck traffic. After the line is buried, the site would be restored to existing conditions, and vegetation would be allowed to regrow or be reseeded if necessary. There are no areas of exposed bedrock in the segment proposed to be buried between CSAH 20 and TH 95; therefore impacts to the skink are expected to be minimal. In the two areas with potential for exposed bedrock (just west of CSAH 20 and east of Chisago Street in Taylors Falls), the proposed transmission line will be overhead along the existing corridor. Whenever feasible, structures will be replaced pole for pole, minimizing any impacts to skink habitat. If a new pole location is necessary within bedrock, drilling is the preferred method. Drilling into bedrock will minimize impacts compared to blasting.

Blanding's Turtle

The Project will not impact the area of MnDNR-designated statewide important Blanding's turtle habitat that is located along Segment 1 because no construction will occur in that area. Impacts to turtles could occur in Segments 2 through 6 if construction impacts turtle habitat (shallow wetlands)

or nesting habitat (sandy uplands). Because the transmission line is a rebuild of an existing line for 97 percent of the route, impacts to previously undisturbed turtle habitat will be avoided. Additionally, wetlands will be spanned whenever possible, and the number of structures located in wetlands will be the same as, and most likely less than, the existing number. Temporary impacts to wetlands will be minimized to the greatest extent possible by not placing access roads in wetlands, and by constructing any poles in wetlands during winter months whenever feasible. Rebuilding the line along existing ROW will minimize impacts to upland nesting habitat.

Rough-seeded Fameflower

The shade-intolerant fameflower occurs in dry prairie remnants and rock outcrop plant communities. The nearest documented occurrences are approximately half a mile south of the transmission route, and will not be impacted by the Project. The route does not cross any dry prairie remnants or undisturbed rock outcrop communities. Therefore impacts to these species are not anticipated.

The remainder of the documented special concern species and species with no legal status are generally associated with Interstate State Park and the Carlos Avery WMA. Impacts to these species are not anticipated because these areas will not be affected by the Project.

Areas of Biodiversity Significance

The area of medium biodiversity significance within the Carlos Avery WMA will not be impacted by the Project because no construction will occur in this segment. The area of high biodiversity significance within Interstate State Park will not be impacted by the Project because it is approximately a quarter mile from the route at the closest point.

Section 5.2.1 discusses potential impacts to the St. Croix Riverway.

4.6.2 MITIGATIVE MEASURES

In order to protect the rare and unique resources along the Project area, appropriate measures will be implemented where necessary to prevent sediment from entering water bodies along the transmission line corridor. Xcel Energy will also provide contractors with the Blanding's turtle fact sheet and recommendations outlined in the DNR letter dated November 20, 2001.

The MnDNR expressed concern about impacts to freshwater mussels, Blanding's turtle and Five-lined Skinks. The MnDNR's letter regarding these issues is attached in Appendix H.3. The MnDNR provided Xcel Energy with literature and suggestions on how to avoid impacting these organisms. This information is summarized below:

Table 4-6 Avoidance and Minimization Measures		
Organism	**Reason for Decline**	**Avoiding and Minimizing Impacts**
Freshwater Mussels	Runoff and physical changes to lakes and rivers.	Prevent sediment from reaching the water body by using silt fencing and rapidly revegetating disturbed soil. No construction will occur within the St. Croix River.
Blanding's Turtles (Emydoidea blandingii)	Wetland drainage and degradation, development of upland nesting areas, increase in predator populations, human disturbance	Inform workers by providing them with a Blanding's turtle flyer; Keep utility access and maintenance roads to a minimum; Below-ground utility construction returned to original grade; Construction in potential nesting areas should be limited to the period between September 15 and June 1; Turtles in imminent danger should be moved by hand out of harm's way; Mechanical maintenance of access roads during fall to spring
Five-lined Skink (Eumeces fasciatus)	Agricultural development	Recommend avoiding major alteration of habitat. Preferred habitat in Minnesota is moist, wooded or partially wooded areas with signficant cover and basking sites that include rock outcrops. The Project will not significantly alter habitat. Temporary impacts in bedrock area will be minimized by replacing pole for pole when feasible, and when not feasible, drilling rather than blasting.

Section 4.2.5.2 discusses mitigation measures to protect the unique resources of the St. Croix Riverway.

5.0 AGENCY INVOLVEMENT, PUBLIC PARTICIPATION AND REQUIRED PERMITS AND APPROVALS

5.1 AGENCY CONTACTS

Refer to Appendix H for agency correspondence letters. Several agencies were contacted for their input on the Project and are listed below.

5.1.1 CITY OF LINDSTROM

The Project follows the existing overhead line through downtown Lindstrom. Meetings were held with City representatives and staff to discuss the Project. Aesthetics and compatibility with the City of Lindstrom's re-development plans were studied as the Project was developed. During the meetings with City of Lindstrom staff and representatives, concern was expressed over aesthetics and compatibility with the City's future plans. As described below, Xcel Energy worked with the City to evaluate the Project's compatibility with the long-term vision of downtown Lindstrom.

A three-phase distribution circuit is under built on the existing wood pole structures. Other utilities such as phone and cable television also utilize the existing poles. The City of Lindstrom is currently working with Minnesota Department of Transportation (Mn/DOT) in developing concepts for separating eastbound and westbound traffic through the City. The City has indicated that, if this highway project occurs, westbound traffic on U.S. Highway 8 would likely be diverted onto the current alignment of First Avenue North. A discussion of the rejected route alternatives that were considered in the City of Lindstrom is found in Section 3.4.1.

Underground transmission was evaluated for this area but is not proposed because:

- Placing the transmission line underground would not enable the elimination of the existing poles, which would still be needed to support the existing distribution line and other utilities.
- Underground installation requires longer restoration times in the event of an outage. The line fault must be located and the line then excavated for repair. This normally takes longer than replacement or repair of an overhead structure.
- Costs for undergrounding are typically about 10 times higher than overhead installation.
- An underground transmission line would require a relatively permanent corridor that may interfere with future re-development and public works projects.

An overhead transmission line was judged by Xcel Energy to be preferable for the following reasons:

- Replacing the existing 69 kV line could be accomplished using steel poles and longer spans thus decreasing the number of poles from 12 to 7 in the downtown area.

- Construction of the new transmission line structures could include aesthetic enhancements such as underground distribution service lines or underground-compatible designs that would allow the City to eventually place most or all of the distribution service lines underground. The long-term vision of this proposal is a less cluttered appearance of fewer poles carrying fewer wires.
- Cost is lower and restoration times in the even of an outage are shorter compared to underground lines.

The City of Lindstrom does not support the overhead 115 kV transmission proposal through downtown Lindstrom. City representatives have stated that they will oppose this concept and have expressed a preference for underground construction through the downtown area. Xcel Energy will continue to work with the City of Lindstrom on these issues through the permitting process as well as during the final design and engineering process. The Company will work to address the City's concerns to minimize, if practical, visual impacts and conflicts with City land uses.

5.1.2 CITY OF TAYLORS FALLS

Coordination with the City of Taylors Falls has led to an agreement regarding the general location for the Lawrence Creek Substation and the configuration of the transmission line through the City. Issues addressed with the City include aesthetic impacts in the St. Croix River valley and land use compatibility near the substation site. The City has agreed to support the proposed project as it is presented in this application.

5.1.3 MINNESOTA DEPARTMENT OF NATURAL RESOURCES

In 2001, the MnDNR's Natural Heritage and Non-game Research Program were contacted to review the Project area for state-threatened and endangered species and rare natural features. The MnDNR identified 119 known occurrences within one mile of the Project area. The MnDNR highlighted the occurrences that had the potential to be impacted by the Project. Their recommendations are identified in their letter in Appendix H.3. On March 24, 2003, the MnDNR was contacted to give the agency an opportunity to identify any additional information or concerns related to the transmission line upgrade. They had no further comments related to the Project.

The River Management Coordinator for the St. Croix River was contacted to discuss the crossing of the St. Croix River. A meeting was organized to discuss the route and the MnDNR permits and approvals required for the Project. The MnDNR indicated that a Public Water Crossing License would be required to cross the St. Croix River as well as any other crossings of public waters.

5.1.4 MINNESOTA STATE HISTORIC PRESERVATION OFFICE

On October 23, 2001, the SHPO was asked to review the Project area for possible effects to known or potential sites of archaeological or historical significance. The SHPO identified many known NRHP properties and archaeological resources in the Project area and recommended that a more detailed assessment of the Project work and a survey needed to be completed (Appendix H). A

database search was requested on March 29, 2002 and was received on April 2, 2003. On March 19, 2003, the SHPO was contacted once again to address the need for surveys with the existing ROW of the transmission line. The SHPO replied on April 30, 2003 asking Xcel Energy for its recommendation whether an archaeological survey and/or architectural survey would be required since it was more familiar with the details of the Project. In November 2006 an updated database search was received. Section 4.4.2.2 discusses the coordination that will occur with the SHPO as part of the COE permitting process.

5.1.5 U.S. FISH AND WILDLIFE SERVICE

The USFWS was contacted on October 23, 2001, requesting information about threatened and endangered species in the Project area. The agency identified three threatened and endangered species associated with the Project, as described in Section 4.6 (Appendix H). On March 19, 2003, the USFWS was contacted to provide any additional comments or issues that had arisen since Xcel Energy contacted them in 2001. A fax was received on May 15, 2003, identifying a bald eagle's nest in Section 35, Township 34N, Range 20W, that was not within the Project area. Further coordination with the USFWS may occur as part of the federal permitting requirements.

5.1.6 ARMY CORPS OF ENGINEERS

The COE was contacted in 2003 and again in 2006 to discuss the crossing of the St. Croix River. A meeting was organized to discuss the route and the COE permits and approvals required for the Project. The COE indicated that the Project would require a Section 10 permit to cross the St. Croix River and a Section 404 permit for any wetland impacts. The COE permit would be a joint permit covering impacts for both the Minnesota and Wisconsin portions of the Project. The COE will also be the lead federal agency regarding Section 106 (Cultural Impacts) review. Xcel Energy expects to file this application in Summer 2007.

5.1.7 NATIONAL PARK SERVICE

The National Park Service (NPS), along with representatives of the Wisconsin and Minnesota DNRs, is a member of the Lower St. Croix Management Commission. The NPS also retains responsibility for protecting Wild and Scenic Rivers under Section 7(a) of the Wild and Scenic Rivers Act.

The NPS was contacted in 2003 and again in 2006 to discuss the crossing of the St. Croix River. A meeting was organized to discuss the route and the NPS' role in the Project. The NPS stated that the Project is not considered a water resources project and would therefore not require a formal evaluation under Section 7(a). The NPS indicated that it would comment on the COE permit. The NPS also confirmed that their comments would be based on the Lower St. Croix Riverway rules.

5.1.8 WISCONSIN DEPARTMENT OF NATURAL RESOURCES

The Wisconsin DNR was contacted in 2003 to discuss the crossing of the St. Croix River. A meeting was organized to discuss the route and the Wisconsin DNR permits and approvals required

for the Project. The Wisconsin DNR indicated that a Chapter 30 (Water Quality) certification would be required and requested a copy of the COE permit application submittal. Xcel Energy will continue to work with the WDNR as the COE permitting process proceeds.

5.1.9 TRIBAL GROUPS

When projects require federal permits, tribes are contacted in compliance with Section 106 of the National Historic Preservation Act of 1966 (and its amendments) and 36 CFR 800 (procedures on the Advisory Council on Historic Preservation). The following entities representing tribes with interests within the Project area were contacted to obtain comments in relation to the Project:

- Upper Sioux Board of Trustees
- St. Croix Council
- Sokaogon Chippewa Community of Wisconsin
- Santee Sioux Tribal Council
- Red Cliff Band of Lake Superior Chippewa Indians
- Prairie Island Community Council
- Minnesota Chippewa Tribe
- Lower Sioux Indian Community Council
- Lac Vieux Desert Band of Lake Superior Chippewa Indians
- Lac Courte Orielles Band of Lake Superior Chippewa Indians of Wisconsin
- Keweenaw Bay Tribal Council
- Flandreau Santee Sioux Executive Committee
- Bad River Band of Lake Superior Chippewa Indians

No responses were received.

5.2 PUBLIC PARTICIPATION

5.2.1 INFORMATION MEETINGS AND PUBLIC HEARING

Pursuant to Minnesota rules 4400.2750, the PUC will prepare an Environmental Assessment for the Project. That process will include a public meeting to provide the public an opportunity to participate in the development of the scope of the environmental assessment. A public hearing will also be held after completion of the environmental assessment.

5.2.2 IDENTIFICATION OF LAND OWNERS

Xcel Energy has a list of 277 landowners that were identified by reviewing the local tax list and comparing it to the proposed route. The landowners along the proposed and rejected routes were

invited to the public information meeting on April 23, 2003, and were notified as part of the Notice Plan in September 2006. The names of the landowners are included in Appendix J.

5.3 REQUIRED PERMITS AND APPROVALS

Table 5-1 shows the permits potentially required for the Project.

Table 5-1
Potential Required Permits

Permit	Jurisdiction
Local Approvals	
Utility Crossing Permit	Chisago County
Driveway Permit	City of Taylors Falls
State of Minnesota Approvals	
Certificate of Need	Public Utilities Commission
Route Permit Application (Alternative Process)	Public Utilities Commission
Utility Permit (Highway Crossings)	MN/DOT
License to Cross Public Waters	Minnesota DNR Division of Lands and Minerals
Public Water Works Permit	Minnesota DNR Division of Waters
NPDES Permit for construction activity	MPCA
State of Wisconsin Approvals	
Certificate of Public Convenience & Necessity	Public Service Commission of WI (acquired)
Chapter 30 Water Quality Permit	Wisconsin DNR
Federal Approvals	
Section 10 Permit (Navigation)	U.S. Army Corps of Engineers
Section 404 Approval (Fill in Wetlands)	U.S. Army Corps of Engineers
Prime Farmland (Form AD-1066)	NRCS

5.3.1 LOCAL APPROVALS

Chisago County Utility Permit

A Utility Permit is required to work within a county road ROW. Additionally, the new Lawrence Creek Substation will require a driveway permit from the City of Taylors Falls. Xcel Energy will apply for these permits once line and substation design is complete.

5.3.2 STATE OF MINNESOTA APPROVALS

Certificate of Need

Section 2.3 describes the Certificate of Need process.

Route Permit (Alternative Process)

A HVTL cannot be constructed without a route permit approved by the Commission. A route permit under the Alternative Process requires the applicant to be eligible as outlined in Minnesota Rules 4400.2000.

Utility Permit

A permit from the Mn/DOT is required for construction, placement or maintenance of utility lines that occur adjacent or across the highway ROW. These permits will be acquired once the line design is completed. Xcel will make contact with Mn/DOT well in advance of final route approval to determine if any unique siting constraints exist that could potentially necessitate a change in design or route adjacent to Mn/DOT ROW.

License to Cross Public Waters

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 Statues § 84.415 and Minnesota Rules, Chapter 6135. Xcel Energy works closely with the MnDNR on these permits and will file for them once the line design is complete.

Public Water Works Permit

The MnDNR Division of Waters regulates activities that affect the course, current and cross-section of lakes, wetlands, rivers and streams. Under Minnesota Statutes § 103G.245, subd. 1, a MnDNR Public Waters Work Permit is required to:

1. Construct, reconstruct, remove, abandon, transfer ownership of or make any change in a reservoir, dam, or waterway obstruction on public waters; or
2. Change or diminish the course, current, or cross-section of public waters, entirely or partially within the state, by any means, including filling, excavating or placing of materials in or on the beds of public waters.

Xcel Energy will determine whether this permit is necessary and, if needed, will file this permit once the line design is complete.

National Pollutant Discharge Elimination System Permit

A NPDES permit is required for stormwater discharges associated with construction activities disturbing in an area equal to or greater than one acre. A requirement of the permit is to develop and implement a SWPPP, which includes BMPs to minimize discharge of pollutants from the site. This permit will be acquired if any of the substation work impacts more than one acre.

5.3.3 STATE OF WISCONSIN APPROVALS

Certificate of Public Convenience & Necessity

Section 2.3 describes the CPCN process for this Project.

Utility Waterway Crossing Permit

A Chapter 30 Utility Water Quality Permit will be required from the Wisconsin DNR. This permit is required for utility crossings of navigable waters.

5.3.4 FEDERAL APPROVALS

Section 10 Approval

Section 10 of the Rivers and Harbors Act of 1899 requires approval prior to the accomplishment of any work in, over or under navigable waters of the United States, or which affects the course, location, condition or capacity of such waters.

Section 404 Approval

Approval under Section 404 of the Clean Water Act is required for projects that discharge temporary or permanent fill within a water of the U.S. or within wetlands.

6.0 ANALYSIS OF FACTORS THAT DEMONSTRATES THE PERMIT SHOULD BE ISSUED

The Commission may not make a final determination whether to grant a route permit until after the CON application currently pending before the PUC is granted. See Minn. R. 4400.2950, subp. 3. In determining whether to issue a permit for a high voltage transmission line, the Commission considers the 14 factors listed in Minnesota Rule 4400.3150. Where the Commission has granted a CON for the proposed line, questions of need, including size, type, timing, alternative system configurations and voltage are not to be considered. Minn. R. 4400.3250. A discussion of each of the relevant factors as they relate to the Project is provided below.

A. Effects on human settlement, including but not limited to displacement, noise, aesthetics, cultural values, recreation and public services

It is not anticipated that any existing homes or businesses will be displaced by the proposed route, which will otherwise have a minimal impact on buildings in the Project area. The noise related to the transmission line will be minimal, as described in Section 4.2.4.1 of this Application. The primary impacts from the Project will be aesthetic, but should not differ significantly from the current 69 kV line that runs along the same route through Lindstrom and past the cities of Center City and Shafer. The line will be buried in the vicinity of Taylors Falls, crossing the river overhead at the same point that the current 69 kV line does today. The number of wires crossing the river will be decreased compared to existing conditions. The Project will have no impact on cultural values or public services within the Project area, and have no more impact on recreation than the current 69 kV line does. Impacts to traffic will be minimized through coordination with Mn/DOT and county and city transportation departments.

B. Effects on public heath and safety

No effects on public health or safety are anticipated. The transmission line will be constructed to comply with NESC and Xcel Energy guidelines and standards. The buried portion of the line will be marked appropriately and inaccessible to the public. The maximum electric field associated with the Project is 0.70 kV/meter underneath the conductors measured at one meter above the ground, significantly less than the EQB's maximum standard of 8 kV/meter. As to EMF, the most recent scientific studies have not found any significant link between EMF and health effects.

C. Effects on land-based economies, including but not limited to agriculture, forestry, tourism and mining

Expansion of existing ROW will be minimal along the rebuild portion of the route; new ROW will generally be confined to the Lawrence Creek Substation and approximately 0.6 miles of the new 115 kV and 161 kV transmission lines. There are no anticipated impacts on current mining, forestry, or tourism in the Project area. The impacts on agricultural lands will be minimal, consisting of

possible short-term crop damage in the course of constructing the line in the ROW, and long-term agricultural land conversion due to pole placement and substation construction in the Lawrence Creek Substation area. Approximately 4.1 acres of land will be converted from agricultural use by construction of the Lawrence Creek Substation. Landowners will be compensated for any loss of land or crops.

D. Effects on archaeological and historic resources

It is not anticipated that the proposed route will have any impacts on previously identified archaeological or historical resources. Avoidance of archaeological and historic architectural properties is the preferred mitigative measure which Xcel Energy follows. Xcel Energy will work with the COE and SHPO during their review process to determine what areas may require surveys for the Project, and Xcel Energy will carry out the appropriate field identification and/or construction monitoring.

E. Effects on the natural environment, including effects on air and water quality resources and flora and fauna

While there may be short-term impacts on air quality due to construction-related emissions, no long-term air quality impacts are anticipated from the transmission line. The line will pass over and near a number of rivers, lakes, and creeks, with minimal impacts. In the Lower St. Croix National Scenic Riverway the line will be located along the existing 69 kV corridor, and will cross the river at the same point where the existing 69 kV line crosses. In addition, the line will pass through and near many wetlands of varying sizes and characteristics. Permanent wetland impacts cannot be wholly avoided because structure limitations prevent every wetland from being fully spanned. It is estimated that six wetlands will not be able to be spanned. Xcel Energy will avoid major disturbance of individual wetlands and drainage systems during construction where possible. When it is not possible, Xcel Energy will employ sound water and soil conservation practices to minimize impacts as discussed in Section 4.5.2 of this Application. Once the line is constructed, it will have no impact on surface water quality. The flora and fauna in the Project area is typical of that found in existing ROWs in agricultural and urban areas and any impacts are anticipated to be minimal and short-term.

F. Effects on rare and unique natural resources

According to the MCBS database, the line is within one mile of 124 occurrences of rare or unique resources, including rare species and natural communities. Additionally, the MnDNR has expressed concerns about the impact of the line's construction on certain freshwater mussels, the Blanding's turtle and the Five-lined Skink. The line is not anticipated to have any impact on rare and unique resources because 97 percent of the line is a rebuild along existing ROW, and the new portion of the route in the Lawrence Creek Substation area is within previously disturbed agricultural land. Xcel Energy will continue to work with the MnDNR to determine appropriate mitigation actions.

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

The Project area substantially mitigates environmental effects. By utilizing the existing ROW, impacts to human settlement, land-based economies, and natural resources are not significantly different than the impacts of the 69 kV line currently in the ROW. The aesthetic impact of the transmission line is improved with respect to the Lower St. Croix National Scenic Riverway, where the line will be buried underground in Taylors Falls. The proposed route is also the best option for accommodating projected transmission needs for the area, as detailed in Xcel Energy's CON application before the PUC.

H. Use or paralleling of existing rights-of-way, survey lines, natural division lines and agricultural field boundaries

Ninety-seven (97) percent of the proposed transmission line uses the same ROW as the existing 69 kV line it replaces. Poles will be placed on section lines and field breaks where possible.

I. Use of existing large electric power generating plant site.

This factor is not applicable to the Project.

J. Use of existing transportation, pipeline and electrical transmission systems or rights-of-way

See G. and H. above.

K. Electrical system reliability

As stated in Xcel Energy's pending application for a CON before the PUC, the Project is critical to maintaining the reliability of the current 69 kV transmission system serving the northwestern fringe of the Twin Cities' metropolitan area

L. Costs of constructing, operating and maintaining the facility which are dependent on design and route

This factor is not applicable to the Project because only one route is proposed. To the extent the factor is interpreted to concern rejected routes, Xcel Energy notes that the costs of constructing and maintaining the facility along the proposed route is likely equal to or less than any alternative route because the proposed route will use existing ROW to the maximum extent possible, which will minimize land acquisition costs and environmental impacts.

M. Adverse human and natural environmental effects which cannot be avoided

The unavoidable impacts to human and natural environment are minimal. Construction related activities would cause short-term impacts, mainly in the form of disturbed soils and potential dust emissions. As to the long-term impacts, the installation of poles and conductors for the overhead portion of the line will not have aesthetic impacts that are significantly different from the current line. The portion of the line placed underground in the Taylors Falls area will have a positive aesthetic impact.

N. Irreversible and irretrievable commitments of resources

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

Construction resources that will be used include concrete, steel and hydrocarbon fuel. Steel and concrete will be required for the substation and transmission line poles and foundations. During construction vehicles will be traveling to and from the site, utilizing hydrocarbon fuels. If the 115/161 kV line were removed in the future, the land could be restored to its prior condition and put to a different use.

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8.0 DEFINITIONS

Aesthetics	Branch of philosophy dealing with the nature of beauty, art, and taste and with the creation and appreciation of beauty.
Aggregate	Composed of mineral crystals of one or more kinds or of mineral rock fragments.
Avian	Of or relating to birds.
Bedroom Community	A group of homes (community) located outside of the city boundaries, a part remote from the center.
Biodiversity	Biological diversity in an environment as indicated by numbers of different species of plants and animals
Circuit	The complete path of an electric current including usually the source of electric energy.
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
De-energize	To disconnect from a source of electricity : shut off the power to.
Demographics	Relating to the dynamic balance of a population especially with regard to density and capacity for expansion or decline.
Double-circuited	The transmission structure is carrying two sets of transmission lines, each with three conductors
Duct bank	The housing (usually concrete) that contains the conductors and cables associated with a buried transmission line
Easements	An interest in land owned by another that entitles its holder to a specific limited use or enjoyment.
Electromagnetic Spectrum	The entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light
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.
Frequency	The number of complete alternations per second of an alternating current : the number of complete oscillations per second of energy (as sound or electromagnetic radiation) in the form of waves.
Grading	To level off to a smooth horizontal or sloping surface.
Herbicide	An agent used to destroy or inhibit plant growth.
Hydrocarbons	Compounds that contain carbon and hydrogen, found in fossil fuels.
Ionization	Removal of an electron from an atom or molecule.
Logarithmic	The exponent that indicates the power to which a number is raised to produce a given number (the *logarithm* of 100 to the base 10 is 2).

Maximum Conductor Voltage	The nominal voltage plus five percent.
Mesic	Of sites or habitats characterized by intermediate moisture conditions, i.e. neither decidedly wet nor decidedly dry.
Oxide	A compound of oxygen with one other more positive element or radical.
Ozone	A form of oxygen in which the molecule is made of three atoms instead of the usual two.
Passerine	Perching birds, mostly small and living near the ground with feet having four toes arranged to allow for gripping the perch; most are songbirds; hatchlings are helpless
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Rebuild	Replacing the structures and conductors of an existing transmission line along the existing alignment
Riparian	Pertaining to the banks of a body of water.
Scientific and Natural Area	A program administered by the MnDNR with the goal to preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations, for scientific study and public edification as components of a healthy environment.
Stray Voltage	A natural phenomenon that can be found at low levels between two contact points in any animal confinement area where electricity is grounded. Electrical systems - including farm systems and utility distribution systems- must be grounded to the earth by code to ensure continuous safety and reliability. Inevitably, some current flows through the earth at each point where the electrical system is grounded and a small voltage develops. This voltage is called neutral-to-earth voltage (NEV). When a portion of this NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently called stray voltage. Stray voltage is not electrocution and is not DC, ground currents, EMFs or earth currents. It only refers to farm animals that are confined in areas of electrical use and not to humans.
Substation	A subsidiary station in which electric current is transformed.
Transformer	An electrical device by which alternating current of one voltage is changed to another voltage.
Ultraviolet radiation	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
Voltage	Electric potential or potential difference expressed in volts.
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	Wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (MnDNR). WMAs are managed for wildlife production and are open to the public for hunting and wildlife watching.

Appendix A
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Appendix B
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Appendix I
Rare and Unique Resources within One Mile of Project

Appendix J
Landowner Names