



1414 West Hamilton Avenue
P.O. Box 8
Eau Claire, WI 54702-0008

Via Electronic Regulatory Filing System

September 13, 2011

Ms. Sandra Paske
Secretary to the Commission
Public Service Commission of Wisconsin
610 North Whitney Way
P.O. Box 7854
Madison, WI 53707-7854

Mr. Dave Siebert
Director, Office of Energy
WI Department of Natural Resources
101 S. Webster Street
P.O. Box 7921
Madison, WI 53707-7921

**RE: APPLICATION FOR PSCW CERTIFICATE OF AUTHORITY FOR THE STONE LAKE -
COUDERAY 69/161 kV TRANSMISSION PROJECT (PSCW DOCKET No. 4220-CE-176)**

Dear Ms. Paske and Mr. Seibert:

Pursuant to Wis. Stat. § 196.49 and Wis. Admin. Code chs. PSC 4 and 112, Northern States Power Company, a Wisconsin Corporation, d/b/a Xcel Energy, (NSPW) hereby submits an application for a Certificate of Public Convenience and Necessity (CPCN) for the Stone Lake - Couderay 69/161 kV Transmission Project.

Included with the printed materials, NSPW is also providing to the Commission in electronic format on disc, the following:

- Microsoft Word, Excel, and Adobe PDF files of the application,
- Geographic Information System data files supporting mapping, and
- Electronic data files supporting need.

We are filing this application according to the Commission's Electronic Regulatory Filing system. If you have any questions concerning this project or require additional information, please contact RaeLynn Asah at (612) 330-6512, raelynn.asah@xcenergy.com and Timothy G. Rogers at (612) 330-1955, timothy.g.rogers@xcelenergy.com.

Sincerely,

Michael L. Swenson
President and Chief Executive Officer
Northern States Power Company (WI)

cc: Scot Cullen, PSCW (25 Paper Copies plus DVD)
Ben Callan, WDNR (2 Paper Copies plus DVD)

Enclosures

Northern States Power Company – Wisconsin

**Application for a Certificate of Public
Convenience and Necessity**

for the

**Stone Lake to Couderay
69 kV Rebuild/161 kV Upgrade
Transmission Project**

PSC Docket No. 4220-CE-176

September 2011

**Volume I
Application and Appendix A**



INTRODUCTION AND OVERVIEW

SECTION	PAGE
A. PROPOSAL SUMMARY	1
B. PURPOSE AND NECESSITY	1
C. PROJECT DESCRIPTION	2
D. PROJECT COST	10
E. CONSTRUCTION SCHEDULE	11
F. ENVIRONMENTAL IMPACTS	11
G. ENTITIES AFFECTED BY THE PROJECT	11
H. PROPERTY OWNERS AFFECTED BY THE PROJECT	11
I. COST OF OPERATION AND RELIABILITY OF SERVICE	11
J. CORRESPONDENCE AND PLEADINGS CONCERNING THIS APPLICATION ARE TO BE SENT TO BOTH:	12
K. CONCLUSION	12

TECHNICAL SUPPORT DOCUMENT

SECTION	PAGE
2.1 ENGINEERING INFORMATION	13
2.1.1 <i>Type and Location of Line Construction</i>	13
2.1.2 <i>General Description</i>	16
2.1.3 <i>Transmission Studies</i>	38
2.1.4 <i>Substation Facilities</i>	44
2.1.5 <i>Contractual Agreements</i>	44
2.1.6 <i>Transmission Service Agreements</i>	45
2.1.7 <i>Transmission and Substation Costs</i>	45
2.1.8 <i>Construction Schedule and Constraints</i>	47
2.1.9 <i>Transmission Tariffs</i>	48
2.2 PROJECT DEVELOPMENT AND ALTERNATIVES	48
2.2.1 <i>System and Local Level Alternatives</i>	48
2.2.2 <i>Route Evaluation Factors</i>	48
2.2.3 <i>Route Corridor Alternatives</i>	49
2.2.4 <i>Public Outreach</i>	53
2.3 GENERAL TRANSMISSION LINE SITING INFORMATION	55
2.3.1 <i>through 2.3.6, Various Maps</i>	55
2.4 DETAILED ROUTE INFORMATION	58
2.4.1 <i>General Route Impacts</i>	58
2.4.2 <i>Table 2 Impacts by Land Type</i>	62
2.4.3 <i>Table 3 Impacts by Land Ownership</i>	62
2.4.4 <i>Table 4 Route Impact Summaries</i>	64
2.4.5 <i>Agricultural Land</i>	64
2.4.6 <i>Forest</i>	65
2.4.7 <i>Conservation Easements</i>	65
2.4.8 <i>Endangered, Threatened, or Special Concern Species and Natural Communities</i>	65
2.4.9 <i>Archaeological and Historic Resources</i>	67
2.4.10 <i>Nearby Airports</i>	68
2.4.11 <i>Access Issues</i>	68
2.4.12 <i>Waterway Permitting Activities</i>	71
2.4.13 <i>Wetlands and Wetland Crossings</i>	72
2.4.14 <i>Mapping Wetland and Waterway Crossings</i>	74
2.5 CONSTRUCTION METHODS.....	74
2.5.1 <i>General Construction Information</i>	74
2.5.2 <i>Underground Construction</i>	79
2.5.3 <i>Stream/River Crossings</i>	79
2.5.4 <i>Wetland Crossings</i>	79
2.5.5 <i>Re-vegetation</i>	80
2.5.6 <i>Erosion Control Plan</i>	81
2.5.7 <i>Materials Management Plan</i>	82
2.5.8 <i>Dewatering Plan</i>	86
2.6 SUBSTATION INFORMATION.....	86
2.6.1 <i>Substation Layouts</i>	86
2.6.2 <i>Size and Orientation</i>	88
2.6.3 <i>Landscaping</i>	88
2.6.4 <i>Plat and Topographic Maps</i>	88
2.6.5 <i>Transmission Lines and Structures</i>	88
2.6.6 <i>Access Roads</i>	89

Application for Certificate of Public Convenience and Necessity and Utility Permit

2.6.7	Construction Procedures.....	89
2.6.8	Environmental Information.....	89
2.7	ELECTRIC AND MAGNETIC FIELDS	91
2.7.1	Transmission Line EMF	92
2.7.2	Existing Substations.....	92
2.7.3	New Power Plants (requiring no line additions).....	93
2.7.4	Stray Voltage (NEV).....	93
2.8	WDNR PERMITS AND APPROVALS	93
2.8.1	Waterways and Wetlands	93
2.8.2	Wetlands Alternatives Analysis.....	94
2.8.3	Stormwater Management	95
2.8.4	Endangered/Threatened Species Incidental Take.....	95
2.9	OTHER AGENCY CORRESPONDENCE	96
2.9.1	Xcel Energy Correspondence.....	96
2.9.2	Agency Responses.....	96
2.9.3	Permits.....	96
2.10	PROPERTY OWNER INFORMATION	97
2.10.1	Alphabetized Lists	97

LIST OF TABLES

TABLE 2.1-1. SEGMENT DESCRIPTIONS FOR PREFERRED ROUTE	17
TABLE 2.1-2. SEGMENT DESCRIPTIONS FOR ALTERNATE ROUTE A	22
TABLE 2.1-3. SEGMENT DESCRIPTIONS FOR ALTERNATE ROUTE B	30
TABLE 2.1-4: SYSTEM LOADING DEFICIENCIES	40
TABLE 2.1-5: SYSTEM VOLTAGE DEFICIENCIES	40
TABLE 2.1-6: THERMAL OVERLOADS ALLEVIATED BY OPTION H	42
TABLE 2.1-7: ELECTRICAL LOSS COMPARISON – STUDY ALTERNATIVES	43
TABLE 2.1-8: ELECTRICAL LOSS COMPARISON – ROUTE ALTERNATIVES.....	43
TABLE 2.1-9. COST ESTIMATE – FOR ROUTE TO PREFERRED RADISSON SUBSTATION SITE.....	45
TABLE 2.1-10. COST COMPARISON – RADISSON SUBSTATION PREFERRED VS. ALTERNATE SITES	46
TABLE 2.4-1: NHI RECORDED STATE OR FEDERAL LISTED SPECIES WITHIN TWO MILES OF TRANSMISSION LINE ROUTES	66
TABLE 2.5-1. ESTIMATED VOLUMES OF EXCAVATED WETLAND AND UPLAND MATERIAL.....	85

APPENDICES

APPENDIX A	IMPACT TABLES
	Table 1A – General Route Impacts
	Preferred Route
	Alternate Route A
	Alternate Route B
	Table 1B – Distance to Potentially Sensitive Buildings
	Preferred Route
	Alternate Route A
	Alternate Route B
	Table 2 – Land Cover Impacts
	Preferred Route
	Alternate Route A
	Alternate Route B
	Table 3 – Public and Tribal Lands
	Preferred Route
	Alternate Route A
	Alternate Route B
	Table 4 – Route Impact Study
	All Routes
APPENDIX B	TRANSMISSION FACILITIES
	B-1 Initial Corridor Map
	B-2 Alternatives Considered but Not Proposed Map
	B-3 Detailed Figures – Environmental Features
	Preferred Route
	Alternate Route A
	Alternate Route B
	B-4 Land Cover Maps
	B-5 USGS Topographic Maps
	B-6 Zoning and Land Use Maps
	B-7 Parcel Boundary and Street Maps
	B-8 Proposed Structure Design Drawings
	B-9 Visual Simulations
	B-10 Special Status Species Report
	B-11 Cultural Resources Report
APPENDIX C	SUBSTATION FACILITIES
APPENDIX D	TRANSMISSION STUDY
APPENDIX E	EMF and STRAY VOLTAGE STUDIES
	E-1 EMF Tables
	E-2 NEV Study
APPENDIX F	AGENCY and PUBLIC CORRESPONDENCE
	F-1 Agency Correspondence
	F-2 Public Correspondence
APPENDIX G	WDNR PERMIT APPLICATION PART 1
APPENDIX H	PROPERTY OWNERS
APPENDIX I	MAILING LISTS

Acronyms and Abbreviations

ACSS	Aluminum Conductor Steel Supported
ACSR	Aluminum Conductor Steel Reinforced
AFR-V.18	Application Filing Requirements for Transmission Line Projects in Wisconsin Version 18
ASNRI	Areas of Special Natural Resource Interest
ATC	American Transmission Company
BIA	Bureau of Indian Affairs
BMP	Best Management Practice
Cedarburg	Cedarburg Science, LLC
CCVT	Coupling Capacitor Voltage Transformers
CPCN	Certificate of Public Convenience and Necessity
Commission	Public Service Commission of Wisconsin
EA	Environmental Assessment
EF	Electric Field
EHS	extra high strength
EMF	Electric and Magnetic Fields
Enbridge	Enbridge Pipelines Incorporated
FCL –	Forest Crop Law
FEMA -	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
HVTL	high voltage transmission line
I&I	Interchange and Interconnection Agreement
kV	kilovolts
kV/m	kilovolts per meter
LCO Tribe	Lac Courte Oreilles Tribe
LCO Reservation	Lac Courte Oreilles Reservation
MEQB	Minnesota Environmental Quality Board
MF	Magnetic Fields
MFL	Managed Forest Law
MG	milliGauss
MISO	Midwest Independent Transmission System Operators
NEPA	National Environmental Policy Act
NERC	National Electric Reliability Council
NESC	National Electric Safety Code
NEV	Neutral to Earth Voltage
NHI	Natural Heritage Inventory
NIEHS	National Institute of Environmental Health Sciences

Acronyms and Abbreviations

NPDES	National Pollutant Discharge Elimination System
NSPM	Northern States Power Company, a Minnesota corporation
NSPW	Northern States Power Company, a Wisconsin corporation
NWEC	Northwestern Wisconsin Electric Company
OPGW	Optical Ground Wire
PLC	Programmable Logic Controller
PSCW	Public Service Commission of Wisconsin
ROW	Right-of-way
SSVT	Station Service Voltage Transformer
THPO	Tribal Historic Preservation Office
TSD	Technical Support Document
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WDATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation
WWI	Wisconsin Wetland Inventory
Xcel Energy	Northern States Power Company, a Wisconsin corporation

INTRODUCTION AND OVERVIEW

A. PROPOSAL SUMMARY

Northern States Power Company, a Wisconsin corporation (NSPW, and hereinafter referred to as Xcel Energy) proposes to upgrade the existing transmission line system between the Stone Lake and Couderay substations in Sawyer County, Wisconsin, by adding a new 161 kilovolts (kV) line to the existing 69 kV line between the two substations. Pursuant to Wisconsin Statutes §§ 196.49 and 196.491, and Wisconsin Administration Code chs. PSC 4, 111, and 112, Xcel Energy hereby applies to the Public Service Commission of Wisconsin (PSCW or Commission) for a Certificate of Public Convenience and Necessity (CPCN) for the proposed Stone Lake to Couderay 69 kV Rebuild/161 kV Upgrade Transmission Project (the Project).

Furthermore, in accordance with Wisconsin Statute § 30.025(1m), and Part 1 of Xcel's Utility Permit Application filed on September 13, 2011, Xcel hereby submits Part 2 of its Utility Permit Application to the Wisconsin Department of Natural Resources (WDNR) for the permits necessary to construct the proposed facilities. The information presented in the attached Technical Support Document (TSD) and Appendices contains the detailed information required by the WDNR to evaluate and issue the required permits.

This Application for CPCN and WDNR utility permits has been prepared in accordance with the Application Filing Requirements for Transmission Line Projects in Wisconsin Version 18 (May 2011) (AFR-V.18), issued by the PSCW, WDNR, and the Wisconsin Department of Agriculture, Trade, and Consumer Protection (WDATCP).

In addition to a CPCN from the PSCW and permits from the WDNR, the Project requires review and approval from the Lac Courte Oreilles Tribe (LCO Tribe) and Bureau of Indian Affairs (BIA) to cross the LCO Reservation for approximately 4.2 miles. On December 1, 2010, Xcel Energy entered into an agreement with the LCO Tribe to either maintain the existing 69 kV transmission line or upgrade it to a 161/69 kV double circuit transmission line on the current right of way (ROW) on tribal land within the LCO Reservation. Following the National Environmental Policy Act (NEPA) process, the BIA will release an Environmental Assessment (EA) of the proposed facilities within the LCO Reservation boundaries for public review and comment prior to final BIA Project approval. The EA by the BIA is pending at this time.

B. PURPOSE AND NECESSITY

In 2008, Xcel Energy completed a load serving study of its transmission system in Northwest Wisconsin. The study encompassed a large geographical area, bound by Duluth, Minnesota, Eau Claire, Wisconsin, Bergland, Michigan, and Wausau, Wisconsin. The transmission system in this area is electrically isolated and therefore primarily serves a load serving function. The study showed low voltages on load serving substations connected to the 69 kV line between Stone Lake and Big Falls. The study determined that the best solution to address this issue was the introduction of a 161 kV transmission power source at the Stone Lake Substation that would

run from the Couderay Substation. A 2011 Addendum to the 2008 Study confirms the need for a 161 kV line from Stone Lake to Couderay.

The primary outages of concern in the 2008 Study and 2011 Addendum are loss of the 69 kV connections between Stone Lake – Stone Lake Pump and Big Falls – Whitetail. The peak load level in the area of these connections exceeds the capacity of the transmission system to serve during the outages, and Xcel Energy planning studies show this situation worsening over time. Introducing a 161 kV transmission power source at Stone Lake to run to Couderay addresses this problem. In addition to its inadequate load serving capability, the majority of the 69 kV line between Stone Lake and Big Falls is approximately 50 years old. Major refurbishment work will need to take place on the line to ensure reliable operation in the near future. Rebuilding the existing 69 kV line while adding the new 161 kV circuit will further strengthen the reliability of the electric system that services the area. Without any transmission improvements, area outages will require load shedding so equipment will not be damaged. This can result in extended outages during peak load times.

C. PROJECT DESCRIPTION

The proposed Project includes the following:

Substation Components:

- Constructing a new 161/69 kV substation (Radisson Substation) in Section 20 of Radisson Township (to replace the existing Couderay Substation). The new substation will be on the south side of Polish Road across the road from the existing Couderay Substation, and designed in two stages, ultimately to accommodate two 161-69 kV, 70 megavolt ampere (MVA) autotransformers, two 161 kV line terminations and three 69 kV line terminations. The initial 161 kV installation will accommodate one line termination, a 161 kV breaker, and a transformer. The future 161 kV system will be configured in a standard ring bus scheme designed for additional future expansion to a breaker-and-one-half-breaker scheme. The 69 kV system will be configured in a standard straight bus scheme.
- Removing the existing Couderay Substation from Section 20 of Radisson Township.
- Upgrading the Stone Lake Substation in Section 5 of Bass Lake Township. The upgrades would be installed within the existing fenced area. The upgrade includes installation of a 161 kV line termination, a 161 kV breaker, a motor operated disconnect switch, and a motor operator on the existing switch in position 6R2B6 to create a sixth position in the existing 161 kV ring bus. The existing substation configuration is not conducive to conversion to a breaker-and-a-half scheme due to the existing layout and limited additional space.
- Making no changes to the components within the Sand Lake Substation or the Edgewater Pumping Station, which are located between the Stone Lake and proposed Radisson substations.

Transmission Components:

- Rebuilding the existing 69 kV connection between the Stone Lake Substation and the new Radisson Substation, including maintaining the connections to the Sand Lake Substation and the Edgewater Pumping Station.
- Constructing a 161 kV connection between the Stone Lake Substation and the new Radisson Substation.
- Construct a new 69 kV connection between the new Radisson Substation and the Northwestern Wisconsin Electric Company-owned (NWECC-owned) Stacik distribution substation in Section 20 of Radisson Township.

Depending on the final route and configuration selected by the PSCW, the transmission line would be between approximately 21 and 32 miles long. Three Route Alternatives between the Stone Lake Substation and the Radisson Substation are included in this Application: the Preferred Route, Alternate Route A, and Alternate Route B. The three Route Alternatives are shown in Appendix B.

The Preferred Route would consist of:

- **Upgrading the existing 69 kV line to 161 kV between the Stone Lake Substation and the point where the existing 69 kV line splits from the existing 345 kV American Transmission Company (ATC) structures.** The northernmost portion of this route would consist of building approximately 0.2 miles of single circuit 161 kV line east of the Stone Lake Substation adjacent to existing 69 kV structures, and then replacing the existing 69 kV single circuit structure with 161/69 kV double circuit structures along the existing transmission ROW for approximately 0.7 miles. The rest of this section (5.9 miles) would consist of upgrading the 69 kV line currently on the 345/69 kV structures (the 345 kV line is owned by ATC and the 69 kV line is owned by Xcel Energy) to 161 kV; no other changes to these existing structures would occur.
- **Constructing a new 69 kV line that is generally parallel to the upgraded 345/161 kV structures from the Stone Lake Substation to the point where the 345 kV structures split off to the south.** For the majority of this section, the 69 kV structures would be approximately 70 feet to the east of the 345/161 kV structures, centerline to centerline, requiring an additional 35 feet of ROW width. The exception is a 1.5 mile section where the 69 kV line would be on new ROW due to limited space in the area just north of Sand Lake near the State Highway 27/70 intersection.
- **Removing the existing 69 kV single circuit H-frame structures from the point where the 345 kV structures split off down from the 69 kV circuit and the 69 kV circuit continues to the Couderay Substation, and constructing new 161/69 kV double circuit structures to the Radisson Substation.** This section would be 11.3 miles long, with all but the southernmost 0.7 miles within existing transmission ROW.
- **Maintaining the existing 1.4-mile 69 kV tap line to the Edgewater Pumping Station.**

- **Building a new 0.4 mile 69 kV tap from the new Radisson Substation to the Stacik Substation within existing ROW.**

A schematic of the Preferred Route is shown below.

Application for Certificate of Public Convenience and Necessity and Utility Permit

Introduction and Overview



Alternate Route A presents an alternate route for the 69 kV line, and would consist of:

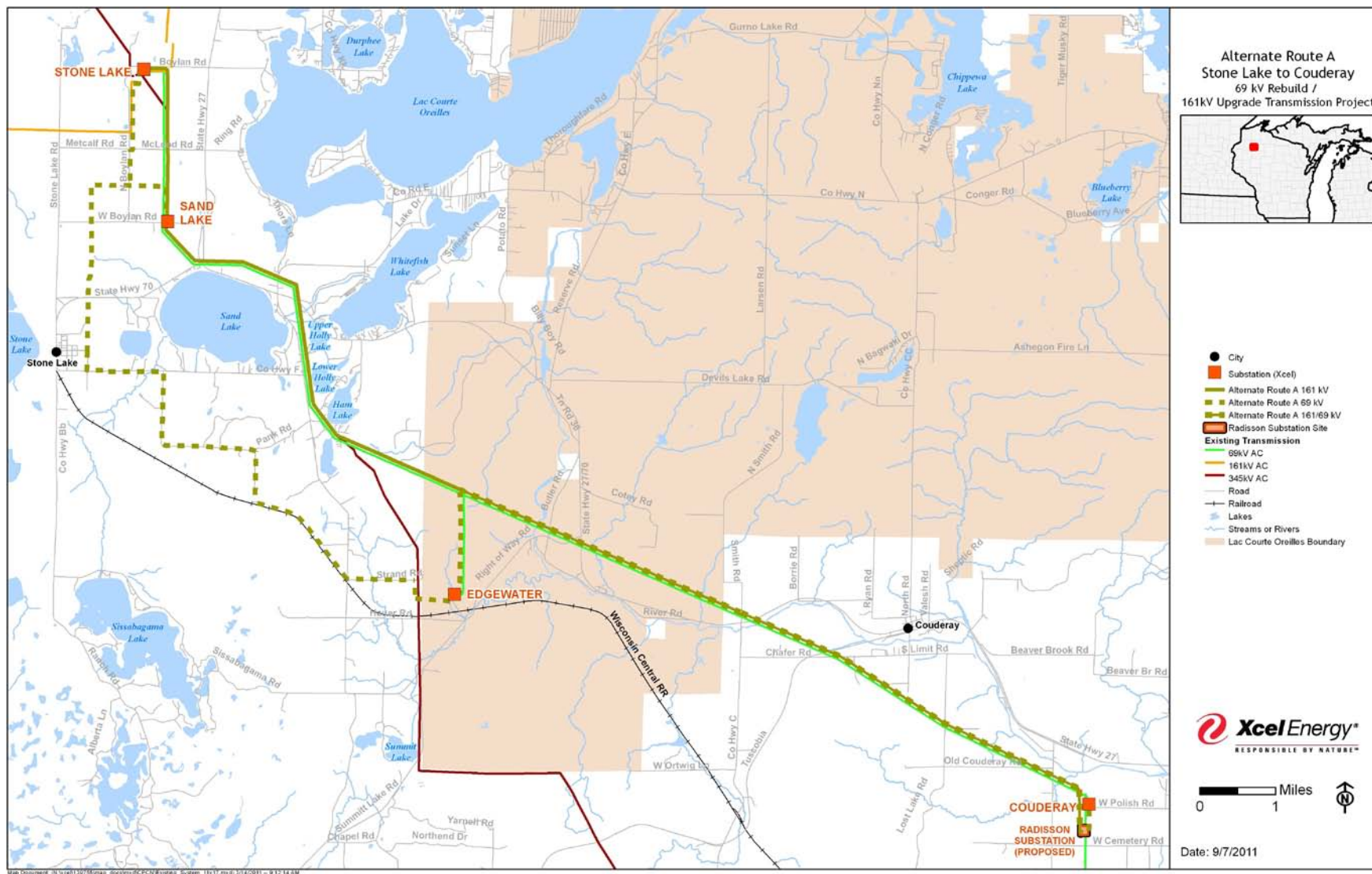
- **Upgrading the existing 69 kV line to 161 kV between the Stone Lake Substation and the point where the existing 69 kV tap line from the Edgewater Pumping Station joins the main 69 kV line across the LCO Reservation.** The northernmost portion of this route would consist of building approximately 0.2 miles of single circuit 161 kV line east of the Stone Lake Substation adjacent to existing 69 kV structures, and then replacing the existing 69 kV single circuit structure with single circuit 161 kV structures along the existing transmission ROW for approximately 0.7 miles. As with the Preferred Route, the middle 5.9 miles of this section would consist of upgrading the 69 kV line currently on the 345/69 kV structures to 161 kV; no other changes to these existing structures would occur. But the easternmost 1.8 miles of this section would consist of removing the existing 69 kV H-frame structures east of where the existing 69 kV line splits from the 345 kV structures and constructing new 161 kV single circuit structures within the existing transmission ROW.
- **Constructing 69 kV single circuit structures along new ROW from the Stone Lake Substation, west and south around Sand Lake, and east to the Edgewater Pumping Station.** This would include constructing a 69 kV connection to the Sand Lake Substation along new ROW. The existing 69 kV line running north from the Edgewater Pumping Station up to the main transmission corridor crossing the LCO Reservation would remain unchanged. This section would be 12.4 miles long.
- **Removing the existing 69 kV single circuit H-frame structures from the point where the 69 kV tap from the Edgewater Pumping Station joins the main transmission corridor running through the LCO Reservation to the Couderay Substation, and constructing new 161/69 kV double circuit structures to the Radisson Substation.** This section would be 9.7 miles long, with all but the southernmost 0.7 miles along existing transmission ROW.
- **Maintaining the existing 1.4 mile 69 kV tap line to the Edgewater Pumping Station.**
- **Building a new 0.4 mile 69 kV tap from the new Radisson Substation to the Stacik Substation within existing ROW.**

A schematic of Alternate Route A is included below.

Sawyer County, WI

Application for Certificate of Public Convenience and Necessity and Utility Permit

Introduction and Overview



Alternate Route B presents an alternate route for the 161 kV line and would consist of:

- **Maintaining the existing 69 kV line between the Stone Lake Substation and a point southwest of Lower Holly Lake.** The northernmost portion of this route would consist of maintaining approximately 0.2 miles of single circuit 69 kV line east of the Stone Lake Substation on existing 69 kV structures, and then replacing the existing 69 kV single circuit structure with 161/69 kV double circuit structures along the existing transmission ROW for approximately 0.7 miles. The remaining 5.2 miles would consist of no change to the existing 69 kV conductor currently located on the 345/69 kV structures.
- **Constructing a 161 kV line on new structures between the Stone Lake Substation and a point southwest of Lower Holly Lake.** Approximately 1.6 miles of this section would consist of the new 161 kV structures being placed parallel to the existing 345/69 kV structures; the remaining 3.4 miles would be along new ROW.
- **Constructing 161/69 kV double circuit structures along new ROW from southwest of Lower Holly Lake, around the southern edge of the LCO Reservation, and up to the point where the existing 69 kV line crosses Smith Road.** This section would be 12.2 miles long.
- **Removing the existing 69 kV single circuit H-frame structures from the Smith Road crossing to the Couderay Substation, and constructing new 161/69 kV double circuit structures to the Radisson Substation.** This section would be 5.7 miles long, with all but the southernmost 0.7 miles along existing transmission ROW.
- **Constructing a new 0.7 mile 69 kV tap line to the Edgewater Pumping Station.**
- **Building a new 0.4 mile 69 kV tap from the new Radisson Substation to the Stacik Substation within existing ROW.**
- **Removing all the existing 69 kV single circuit H-frame structures from within the LCO Reservation boundaries, including the segments adjacent to and immediately east and west of the LCO Reservation.**

A schematic of Alternate Route B is included below.

Sawyer County, WI

Application for Certificate of Public Convenience and Necessity and Utility Permit

Introduction and Overview

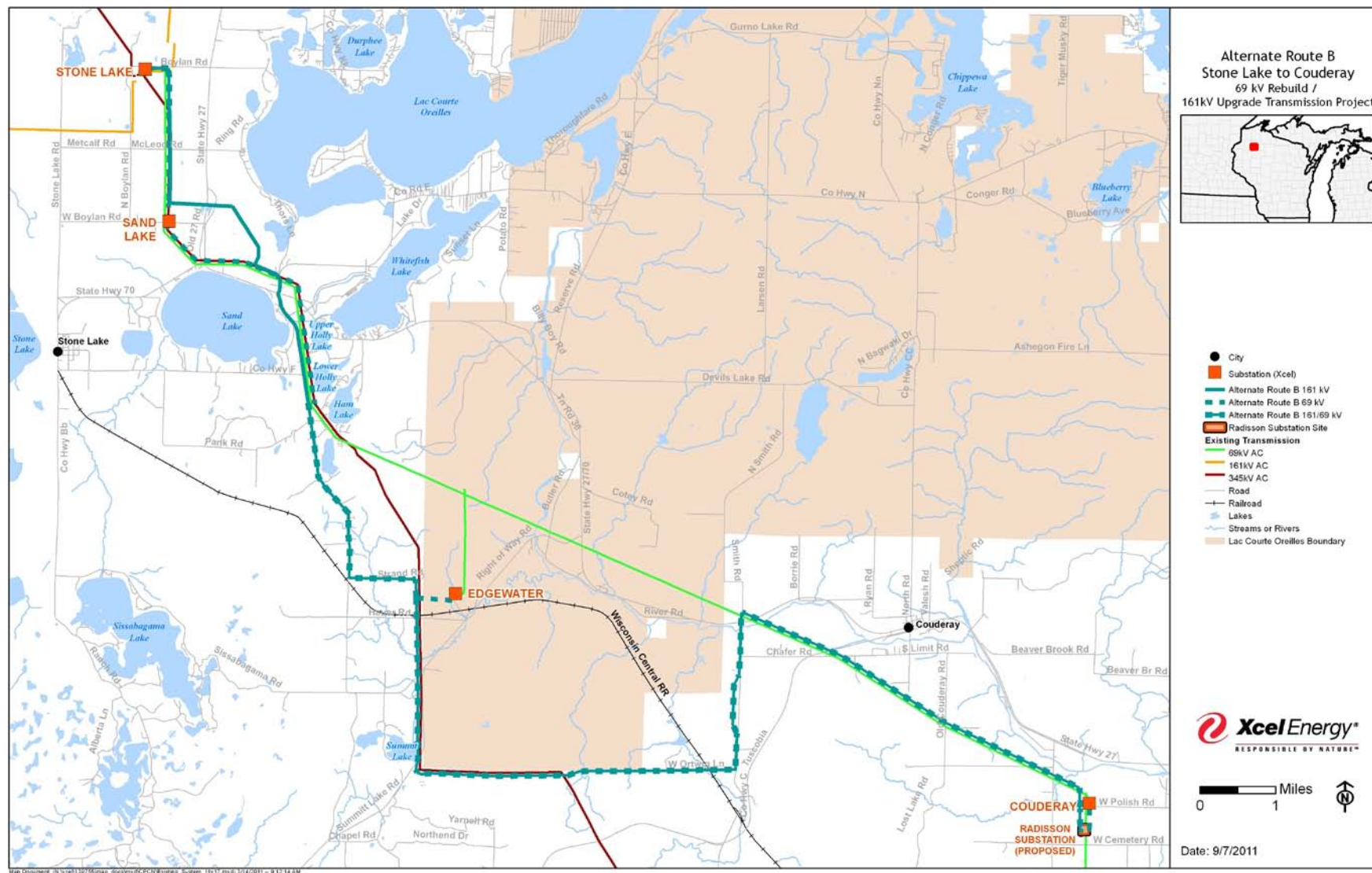


Table A - 1 provides key information on the three routes, with Section 2.4, below, providing more detailed information.

Table A - 1: Corridor Sharing of Route Alternatives

	Preferred Route	Alternate Route A	Alternate Route B
Percent (miles) following existing transmission line	90.2 % (19.5 miles)	63.7% (20.7 miles)	56.4% (16.3 miles)
Percent (miles) following road, pipeline or rail, but not transmission line)	2.4% (0.5 miles) 0.5 miles of 69 kV single circuit line along road corridor	22.1% (7.2 miles) 5.6 miles of 69 kV single circuit line along road corridors; 1.6 miles of 69 kV single circuit line along railroad corridor	30.1% (8.7 miles) 1.7 miles of 161 kV single circuit line along road corridor; 0.9 miles of 161 kV single circuit line along pipeline corridor; 6.1 miles of 161/69 kV double circuit line along road corridor
Percent (miles) not following existing corridors	7.4% (1.6 miles) 1.0 miles of 69 kV single circuit line along new ROW; 0.6 miles of 161/69 kV structures along new ROW	14.2% (4.6 miles) 3.5 miles of 69 kV single circuit line along new ROW; 0.5 miles of 69/69 kV double circuit line along new ROW; 0.6 miles of 161/69 kV structures along new ROW	13.5% (3.9 miles) 0.7 miles of 69 kV single circuit line along new ROW; 0.9 miles of 161 kV single circuit line along new ROW; 2.3 miles of 161/69 kV double circuit line along new ROW
Total Length of Route	21.6 miles	32.5 miles	28.9 miles

Appendix A includes the required impact tables for these alternative routes. Appendix B includes maps showing the location of the alternative routes and substation facilities, local infrastructure, the location of sensitive sites, parcel boundaries, environmental features, and access plans. Appendix C shows the preferred and alternate substation designs and layouts.

D. PROJECT COST

Xcel Energy estimates the total cost of the Project to be as follows depending on the route and substation site ordered by the PSCW:

- **Preferred Route: \$28,480,000**
- **Alternate Route A: \$31,280,000**
- **Alternate Route B: \$35,300,000**

Project costs are estimated and set forth in greater detail in Section 2.1.7 of the TSD, along with a discussion of estimated future costs.

E. CONSTRUCTION SCHEDULE

Construction is expected to begin in second-quarter 2013 through approximately third-quarter 2014. Xcel Energy anticipates that construction of the Project would take approximately 17 to 22 months depending on the final route selected.

These estimated construction time frames include the time necessary to remove the existing 69 kV transmission line structures and ROW clearing. Construction would start after all necessary permits and approvals have been received for the entire Project. Assuming the Preferred Route is selected, the general construction schedule is anticipated to be:

- File CPCN Application - 3rd quarter 2011
- Receive CPCN Order - 4th quarter 2012
- Substation and Line Design - 1st quarter 2013
- ROW Acquisition - 2013
- Substation Construction - 2nd quarter 2013 – 4th quarter 2014
- Transmission Line Construction – 4th quarter 2013 - 3rd quarter 2014
- Final ROW Contacts and Cleanup - 4th quarter 2014 – 2nd quarter 2015
- Project In-Service Date - 4th quarter 2014

F. ENVIRONMENTAL IMPACTS

Xcel Energy believes this Project will be categorized as a Type II action pursuant to Wisconsin Administration Code § PSC 4.10(2). The information necessary for preparation of an environmental assessment is provided in the TSD. Xcel Energy submitted Part 1 of its Utility Permit Application to the WDNR on September 13, 2011. This joint application to the Commission and the WDNR includes Part 2 of Xcel Energy's application for utility permits. The information contained within this joint application includes the detailed technical information required by the WDNR to evaluate and issue the required permits for construction.

G. ENTITIES AFFECTED BY THE PROJECT

Several federal, state, regional, and local units of government, as well as the LCO tribal government, are affected by this Project. All required permits will be obtained prior to construction of the Project, as discussed in Section 2.9 of this document. Mailing lists in the prescribed format to provide the required Project notification to affected members of the public, government officials, libraries, and other entities are provided in Appendix I.

H. PROPERTY OWNERS AFFECTED BY THE PROJECT

Appendix H provides a list of landowners along the alternative routes.

I. COST OF OPERATION AND RELIABILITY OF SERVICE

Xcel Energy believes the proposed Project is the most appropriate means for meeting its obligation as a public utility and transmission company to provide reliable regional transmission

and local distribution service to all users. Each of the proposed Route Alternatives is capable of serving present customers in single contingency conditions, while providing sufficient capacity to serve the anticipated increase in future load. The Project is necessary to ensure continued reliability of the local and regional transmission system, and therefore will not result in annual costs disproportionate to the service value of the work performed or the quality of available service.

J. CORRESPONDENCE AND PLEADINGS CONCERNING THIS APPLICATION ARE TO BE SENT TO BOTH:

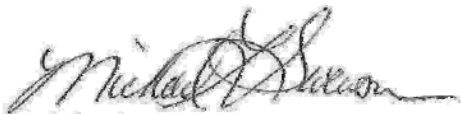
RaeLynn Asah
Permitting Analyst
414 Nicollet Mall, MP 8
Minneapolis, MN 55401
612-330-6512
raelynn.asah@xcelenergy.com

Timothy Rogers
Supervisor, Siting and Land Rights
414 Nicollet Mall, MP 8
Minneapolis, MN 55401
612-330-1955
timothy.g.rogers@xcelenergy.com

K. CONCLUSION

Based on the material contained in or later adopted for incorporation into this joint application, as well as any additional material provided to the Commission or its staff relative to this joint application, Northern States Power Company (doing business as Xcel Energy) requests that the Commission issue a Certificate of Public Convenience and Necessity authorizing the construction of the transmission facilities as described and in the manner set forth herein.

Respectfully submitted this 13th day of September, 2011.



Michael L. Swenson
President and Chief Executive Officer
Northern States Power Company (WI)

2.1 ENGINEERING INFORMATION

This TSD follows AFR-V.18, issued by the PSCW, WDNR, and WDATCP in May 2011.

2.1.1 Type and Location of Line Construction

Xcel Energy proposes to upgrade the existing transmission link between the Stone Lake and Couderay substations in Sawyer County, Wisconsin, by adding a 161 kV high voltage transmission line (HVTL), while maintaining the existing 69 kV link. Three Route Alternatives are included in this Application. To varying degrees, these routes follow existing 69 kV and 345 kV transmission corridors and involve rebuilding portions of the existing 69 kV line to a 161/69 kV double circuit line.

New ROW Routes

As described further below, the three Route Alternatives would require varying amounts of new ROW along routes that have no existing transmission ROW. The new ROW lengths required are summarized below, and more details can also be found in Section 2.1.2.

- **Preferred Route (9.8 % along non-transmission ROW):** 1.5 miles of 69 kV single circuit line along new ROW east of the Sand Lake Substation; 0.6 miles of 161/69 kV structures along new ROW north of the new Radisson Substation. Another 4.5 miles would require additional width along existing transmission ROW to accommodate the proposed 69 kV structures adjacent to the existing 345/69 kV double circuit line.
- **Alternate Route A (36.3 % along non-transmission ROW):** 10.3 miles of 69 kV single circuit line along new ROW between the Stone Lake Substation and the Edgewater Pumping Station; 0.5 miles of 69/69 kV double circuit structures along new ROW; 0.6 miles of 161/69 kV structures along new ROW north of the new Radisson Substation. Another 0.5 miles would require additional width along existing transmission ROW to accommodate the proposed 69/69 kV structures adjacent to the 345/69 kV double circuit line for continued service to the Sand Lake Substation, 0.2 miles of the proposed 69 kV structures adjacent to the existing 345 kV ATC line and Enbridge Pipelines Incorporated (Enbridge) natural gas pipeline would require additional width to the existing ROW, and 0.9 miles of the proposed 69 kV structures adjacent to the existing 161 kV line south of the Stone Lake Substation would require additional width along the existing ROW.
- **Alternate Route B (43.6 % along non-transmission ROW):** 0.6 miles of 69 kV single circuit line along new ROW to maintain service to the Edgewater Pumping Station; 3.5 miles of 161 kV single circuit line along new ROW between the Stone Lake Substation and a point just south of Lower Holly Lake; and 8.4 miles of 161/69 kV double circuit line along new ROW between Lower Holly Lake and the new Radisson Substation. Another 1.7 miles would require additional width along existing transmission ROW to accommodate the proposed 161 kV structures adjacent to the existing 345/69 kV double circuit line; an additional 4.5 miles would require additional width along existing transmission/pipeline ROW to accommodate the proposed 161/69 kV structures

adjacent to the existing 345 kV ATC Line and Enbridge natural gas pipeline located on the western and southern edges of the LCO Reservation.

Rebuild Routes (Existing ROW Sections)

All three Route Alternatives will consist of varying amounts of rebuilding or upgrading existing transmission lines within existing fee-owned or easement ROW. The portions of each route alternative that are proposed to be rebuilt or reconducted along existing ROW are summarized below, and more details can be found in Section 2.1.2.

- **Preferred Route (90.2 % along transmission ROW):**
 - 0.2 miles of existing 69 kV line running east from the Stone Lake Substation to the Stone Lake Pump Station would be maintained, and a parallel single circuit 161 kV line would be placed on structures that overlap (and widen) the existing ROW.
 - 0.2 miles of existing 69 kV line running east from the Stone Lake Pump Station would be removed and replaced with 161/69 kV double circuit structures that overlap (and widen) the existing ROW.
 - 0.5 miles of existing 69 kV line running south from Boylan Road to the intersection with the 345/69 kV structures would be removed and replaced with 161/69 kV double circuit structures within existing ROW.
 - For 5.8 miles, the existing 69 kV conductor that is located on the 345/69 kV structures would be removed and replaced with 161 kV conductor.
 - 10.8 miles of existing 69 kV H-frame structures would be removed and replaced with 161/69 kV double circuit structures within existing ROW from the point where the existing 69 kV line splits from the 345 kV line to a point 0.6 miles north of the proposed new Radisson Substation.
 - The 1.4 mile existing 69 kV tap line to the Edgewater Pumping Station would be maintained (no changes proposed, with the exception of one new structure being constructed, and one existing structure being removed at the northern end of the tap line within existing ROW).
 - As mentioned above, 4.5 miles of the proposed 69 kV structures adjacent to the existing 345/69 kV double circuit line would overlap (and widen) the existing ROW.
 - 0.4 miles of single circuit 69 kV structures would be placed between the new proposed Radisson Substation and the existing Stacik Substation within existing ROW (the existing H-frame 69 kV structures in this route would be removed and replaced with single pole wood or light duty steel structures).

- **Alternate Route A (63.7 % along transmission ROW):**
 - 0.2 miles of existing 69 kV line running east from the Stone Lake Substation to the Stone Lake Pump Station would be maintained, and a parallel single circuit 161 kV line placed on structures that overlap (and widen) the existing ROW.
 - 0.2 miles of existing 69 kV line running east from the Stone Lake Pump Station would be removed and replaced with single-circuit, 161 kV structures that overlap (and widen) the existing ROW.
 - 0.5 miles of existing 69 kV line running south from Boylan Road to the intersection with the 345/69 kV structures would be removed and replaced with 161 kV single circuit structures within existing ROW
 - 0.9 miles of the proposed 69 kV structures adjacent to the existing 161 kV line south of the Stone Lake Substation would widen (but not overlap) the existing ROW.
 - For 5.8 miles, the existing 69 kV conductor that is located on the 345/69 kV structures would be removed and replaced with 161 kV conductor.
 - 10.8 miles of existing 69 kV H-frame structures would be removed and replaced with 1.8 miles of single circuit 161 kV structures, and 9.0 miles of 161/69 kV double circuit structures within existing ROW from the point where the existing 69 kV line splits from the 345 kV line to a point 0.6 miles north of the proposed new Radisson Substation.
 - The 1.4 mile existing 69 kV tap line to the Edgewater Pumping Station would be maintained (no changes proposed, with the exception of one new structure being constructed, and one existing structure being removed at the northern end of the tap line within existing ROW).
 - As mentioned above, 0.5 miles of the proposed 69/69 kV double circuit structures adjacent to the 345/69 kV double circuit line (required under this alternative to provide continued service to the Sand Lake Substation) would overlap and widen the existing ROW; 0.2 miles of the proposed 69 kV structures adjacent to the existing 345 kV ATC line and Enbridge natural gas pipeline would widen (but not overlap) the existing ROW, and 0.9 miles of the proposed 69 kV structures to the existing 161 kV line south of the Stone Lake Substation would widen (but not overlap) the existing ROW.
 - 0.4 miles of single circuit 69 kV structures would be placed between the new proposed Radisson Substation and the existing Stacik Substation within existing ROW (the existing H-frame 69 kV structures in this route would be removed and replaced with single pole wood or light duty steel structures).
- **Alternate Route B (56.4 % along transmission ROW):**
 - 0.2 miles of existing 69 kV line running east from the Stone Lake Substation to the Stone Lake Pump Station would be maintained, and a parallel single circuit

161 kV line would be placed on structures that overlap (and widen) the existing ROW.

- 0.2 miles of existing 69 kV line running east from the Stone Lake Pump Station would be removed and replaced with 161/69 kV double circuit structures that overlap (and widen) the existing ROW.
- 0.5 miles of existing 69 kV line running south from Boylan Road to the intersection with the 345/69 kV structures would be removed and replaced with 161/69 kV double circuit structures within existing ROW
- For 5.0 miles, the existing 69 kV conductor that is located on the 345/69 kV structures would be maintained (no changes proposed).
- 5.0 miles of existing 69 kV H-frame structures would be removed and replaced with 161/69 kV double circuit structures within existing ROW from the point where Xcel Energy's existing 69 kV line crosses Smith Road to a point 0.6 miles north of the proposed new Radisson Substation.
- 1.7 miles of the proposed 161 kV structures adjacent to the existing 345/69 kV double circuit line would overlap (and widen) the existing ROW, and 4.5 miles of the proposed 161/69 kV structures adjacent to the existing 345 kV ATC line and Enbridge natural gas pipeline would widen (but not overlap) the existing ROW.
- 0.4 miles of single circuit 69 kV structures would be placed between the new proposed Radisson Substation and the existing Stacik Substation within existing ROW (the existing H-frame 69 kV structures in this route would be removed and replaced with single pole wood or light duty steel structures).

The Route Alternatives and the new Radisson Substation site alternatives are shown in Appendices B and C, respectively. Detailed route descriptions and information are provided in Sections 2.3 and 2.4 below. Detailed substation related information is provided in Sections 2.1.4 and 2.6 below.

2.1.2 General Description

Xcel Energy proposes to upgrade their existing 69 kV transmission facility in Sawyer County to include a new 161 kV transmission line. The following description of the three Route Alternatives considered for this Project include brief narrative descriptions of the entire route, followed by a detailed discussion of each alternative by route alignment segments. This approach is based on the complex nature of the alternatives considered: each alternative includes multiple route segments, with different voltages and design elements.

Preferred Route:

Xcel Energy's Preferred Route provides the most direct connection between the Stone Lake and Radisson substations, minimizing both the total length of the transmission line and the number of pole structures necessary. This route also shares the most existing transmission ROW of the alternatives considered (90.2% of its length). The Preferred Route is comprised of the following segments: 1A, 1B, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14A, 14B, 15A, 15B, 16A, 16C, 17, 18A,

18B, 18C, 18D, 71, and 72, which are depicted in Appendix B-3. Table 2.1-1, below, provides more detail on existing and proposed structures, along with the transmission ROW for each segment of this route. More information can also be found in Sections 2.3 and 2.4 below.

Table 2.1-1. Segment Descriptions for Preferred Route

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None – proposed transmission ROW will overlap with existing 69 kV line ROW described for Segment 1B <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures, (requiring 50 foot additional ROW for 100 foot total ROW width)	1A	0.2	This segment exits the Stone Lake Substation to the east and proceeds north. South of Boylan Road, this segment heads east for approximately 460 feet to where it is joined by the 69 kV line at Segment 2.
<u>Existing</u> 69 kV lines entering Stone Lake Substation on 50 foot ROW <u>Proposed</u> Single circuit 69 kV line on existing structures (using existing ROW)	1B	0.2	This segment exits the Stone Lake Substation to the east and proceeds along existing 69 kV structures to the point where it joins the 161 kV line at Segment 2. This segment includes the structure that is the tap point into the Stone Lake Pump Station (tap will be maintained)
<u>Existing</u> Single circuit 69 kV line on steel structures on 75 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on steel structures (requiring 50 foot additional ROW for 100 foot total ROW width)	2	0.2	Once joined by the 69 kV line east of the Stone Lake Pump station, this segment would be a double circuited 161/69 kV line running on the south side of Boylan Road along existing ROW, south of the existing double circuit line that is directly adjacent to the road.
<u>Existing</u> Single circuit 69 kV line on steel structures on 100 foot ROW	3	0.5	The proposed double circuited 161/69 kV line would turn south off Boylan Rd and follow the existing ROW to the juncture with the existing 345 kV transmission line.

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Proposed</u> Double circuit 161/69 kV line on new steel structures on existing (100 foot) ROW			
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures; new 69 kV line on parallel wooden of light duty steel structures (requiring 35 foot additional ROW for 155 foot total ROW width)	4	1.1	The existing 69 kV line on the structures south of the junction with the 345 kV line would be upgraded to 161 kV. The 69 kV line would be placed on new single circuit structures paralleling the 345/69 kV line. These structures would be approximately 70 feet east of the existing structures, centerline to centerline, sharing approximately 15 feet of ROW.
	5	0.2	This segment is a continuation of Segment 4.
	6	0.2	This segment is a continuation of Segments 4 and 5. At the Sand Lake Substation, the 69 kV line would enter the Substation while the 161 kV line would continue along the existing structures and not enter the Substation.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures on 50 foot wide ROW	7	1.0	Exiting the Sand Lake Substation to the east, this segment would be a single-circuit 69 kV line on the north side of West Boylan Road. The segment would cross State Highway 27 and follow the south side of field lines for approximately one-half mile before turning south.
	8	0.5	At the eastern terminus of Segment 7, the single-circuit 69 kV line turns south for approximately one-half mile, following a tree line to the intersection with the 345/69 kV structures.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures on existing ROW	9	1.3	From the Sand Lake Substation to the juncture with the proposed single-circuit 69 kV line of Segment 8, this segment will consist of upgrading the 69 kV line to 161 kV on the existing steel structures.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW	10	0.2	At the juncture of Segments 8 and 9, the existing 69 kV line on the 345/69 kV structures would be upgraded to 161 kV in Segment 10. The 69 kV line would be placed on new single circuit structures paralleling the 345/69 kV line. These structures would be approximately 70 feet north of the

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures; new 69 kV line on parallel wooden or light duty steel structures (requiring 35 foot additional ROW for 155 foot total ROW width)			existing structures, centerline to centerline, sharing approximately 15 feet of ROW.
	11	0.4	This segment is a continuation of Segment 10, with the route heading southeast along the existing transmission and pipeline corridor to just east of County Highway E.
	12	1.9	This segment is a continuation of Segment 11. Approximately a quarter mile east of County Highway E, the route turns south and continues to follow the existing transmission and pipeline corridor for 1.5 miles past Upper Holly Lake and Lower Holly Lake. The 69 kV line would be placed on new single circuit structures paralleling the 345/69 kV line. These structures would be approximately 70 feet east of the existing structures, centerline to centerline, sharing approximately 15 feet of ROW.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures; new 69 kV line on parallel wooden or light duty steel structures (requiring 35 foot additional ROW for 155 foot total ROW width)	13	0.6	This segment is a continuation of Segment 12. Between Lower Holly Lake and Ham Lake, the route turns southeast and continues to follow the existing transmission and pipeline corridor to the point south of Ham Lake where the existing 69 kV line splits from the 345 kV line. The proposed 69 kV line would be placed on new single circuit structures paralleling the 345/69 kV line. These structures would be approximately 70 feet east of the existing structures, centerline to centerline, sharing approximately 15 feet of ROW.
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures within existing ROW	14A	1.6	Directly south of Ham Lake, the route turns southeast and follows the existing 69 kV line corridor as it splits from the 345 kV line. The proposed double circuit line would be within the existing ROW crossing the Flambeau River State Forest and entering LCO Reservation, and continue to with a point approximately 540 feet west of 69 kV tap line from the Edgewater Pumping Station.

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 100 foot ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures; parallel single circuit 69 kV line on wooden or light duty steel structures within existing ROW	14B	0.1	For this short segment, the 69 kV line and 161 kV lines proceed east along the existing ROW on separate parallel structures to the 69 kV tap line to the Edgewater Pumping Station.
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 75 foot ROW <u>Proposed</u> No changes – existing tap line maintained	15A	1.4	This segment would maintain the existing H-frame 69 kV tap line serving the Edgewater Pumping Station, ending at the existing structure that will be replaced just south of the main route through the LCO Reservation
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 75 foot ROW <u>Proposed</u> 69 kV tap line rebuilt on new wooden or light duty steel structures within existing ROW	15B	<0.1	This short segment would connect the existing tap line from the Edgewater Pumping Station to the main 69 kV line through the ROW; it passes under the 161 kV main line to end at a dead-end structure
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 100 foot ROW <u>Proposed</u> Single circuit 161 kV line on new davit arm steel structures; parallel single circuit 69 kV line on wooden or light duty steel structures within existing ROW	16A	0.1	For this short segment, the 69 kV and 161 kV lines proceed east along the existing ROW on separate parallel structures from the 69 kV Edgewater Pumping Station tap line to the point where the lines go on double-circuit structures.

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 100 foot ROW	16C	3.9	From approximately 560 feet east of the tap to the Edgewater Pumping Station, the proposed double circuit 161/69 kV line would continue southeast along existing ROW to the intersection with County Highway C.
<u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures within existing ROW	17	5.0	This segment is a continuation of Segment 16C. The proposed double circuit 161/69 kV line would continue along existing ROW, crossing State Highway 27/70 and the Couderay River to a point approximately 0.5 miles north of the proposed Radisson Substation.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures on 100 foot ROW	18A	0.3	This segment would be a continuation of Segment 17. The proposed double circuit 161/69 kV would turn south off of the existing corridor and follow field lines along new ROW to the alternate location for the Radisson Substation site south of Polish Road.
	18B	0.3	This segment would be a continuation of Segment 18A, heading south to the preferred location for the Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden structures on 50 foot ROW	18C	0.1	This segment would connect the 69 kV line into the preferred Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures on 100 foot ROW	18D	<0.1	This segment would connect the 161 kV line into the preferred Radisson Substation site

Preferred Route			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100 foot ROW	71	0.1	This segment would extend south from the Stacik Substation to the connection point to the alternate site for the new Radisson Substation
	72	0.3	This segment would be a continuation of Segment 71, connecting to the preferred site for the new Radisson Substation

Alternate Route A:

Alternate Route A presents an alternative location for the 69 kV link between the Stone Lake Substation and the Edgewater Pumping Station; the 161 kV alignment is similar to the Preferred Route (upgrades and rebuilds within existing transmission ROW). Alternate Route A is the same as the Preferred Route from the point where the 69 kV tap from the Edgewater Pumping Station joins the main transmission corridor crossing the LCO Reservation south to the Radisson Substation.

Alternate Route A is comprised of the following segments: 1A, 1C, 1D, 9, 15A, 15C, 16B, 16C, 17, 18A, 18B, 18C, 18D, 20, 21, 22, 23, 24, 24A, 24B, 26, 27, 28, 29, 30, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 71, and 72, which are depicted in Appendix B-3.

Table 2.1-2 provides more detail on existing and proposed structures and ROW for each segment of this route. More information can also be found in Sections 2.2.3, 2.3, and 2.4 below.

Table 2.1-2. Segment Descriptions for Alternate Route A

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None – proposed transmission ROW will overlap with existing 69 kV line ROW described for Segment 1B	Same as Preferred Route		
	1A	0.2	This segment exits the Stone Lake Substation to the east and proceeds north. South of Boylan Road, this segment heads east for approximately 460 feet to where it ends at the meeting point with Segment 1D.
<u>Proposed</u> Single circuit 161 kV line on new davit arm steel structures, (requiring 50 foot additional ROW for 100 foot total ROW width)			

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> 69 kV lines entering Stone Lake Substation on 50 foot ROW	1C	<0.1	This one-span segment exits the Stone Lake Substation and ends at a dead-end structure with a tap to the Stone Lake Pump Station
<u>Proposed</u> Single circuit 69 kV line on new wooden or light duty steel structures within existing ROW	1D	0.1	This segment is a single circuited 69 kV line that heads north from the three-way split structure and maintains the existing 69 kV tap into the Stone Lake Pump Station
<u>Existing</u> Single circuit 69 kV line on steel structures with 75 foot ROW	20	0.2	This segment is a single circuited 161 kV line running on the south side of Boylan Road along existing ROW, south of the existing double circuit line that is directly adjacent to the road.
<u>Proposed</u> Single circuit 161 kV line on new steel structures (requiring 50 foot additional ROW for 100 foot total ROW width)			
<u>Existing</u> Single circuit 69 kV line on steel structures with 100 foot ROW	21	0.5	The proposed single circuit 161 kV segment turns south off Boylan Rd and follows the existing ROW to the juncture with the existing ATC 345 kV transmission line.
<u>Proposed</u> Single circuit 161 kV line on steel structures on existing (100 foot) ROW			
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW	22	1.0	The existing 69 kV line on the existing structures south of the junction with the 345 kV line would be upgraded to 161 kV.
<u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures within existing ROW			

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures; new double circuit 69/69 kV line on parallel horizontal line post steel structures (requiring 40 foot additional ROW for 160 foot total ROW width)	23	0.2	This portion of the 161 kV alignment is a continuation of Segment 22, with the existing 69 kV line on the existing structures upgraded to 161 kV. The 69/69 kV alignment is a continuation of Segment 37 (described below) to provide an in/out connection to the Sand Lake Substation. These structures would be approximately 75 feet west of the existing structures, centerline to centerline, sharing approximately 10 feet of ROW.
	24	0.2	This portion of the 161 kV alignment is a continuation of Segment 23. At the Sand Lake Substation, the 69/69 kV line would enter and exit the Substation on double circuit structures; the 161 kV line would continue along the existing 345/69 kV structures and not enter the Substation.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> New 69 kV single circuit line on parallel horizontal line post wood or light duty steel structures (taps to/from Sand Lake Substation would primarily be within existing ROW)	24A	<0.1	This segment would be a single circuit tap line from the double circuit 69/69 kV line of Segment 24 east to the Sand Lake substation. The westernmost structure would be located approximately 75 feet west of existing Sand Lake Substation ROW
	24B	<0.1	This segment would be a single circuit tap line exiting the south side of the Sand Lake Substation heading west and north to the double circuit 69/69 kV line of Segment 24. The westernmost structure would be located approximately 75 feet west of existing Sand Lake Substation ROW
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures within existing ROW	Same Route as Preferred Route		
	9	1.3	Exiting the Sand Lake Substation to the south, this segment would consist of upgrading the 69 kV line to 161 kV on the existing steel structures.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW	26	0.2	This segment is a continuation of Segment 9, consisting of an upgrade of the 69 kV line on the 345/69 kV steel structures to 161 kV.
	27	0.4	This segment is a continuation of Segment 26, consisting of an upgrade of the 69 kV line on the

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Proposed</u> Upgrade to double circuit 345/161 kV line on existing steel structures within existing ROW			345/69 kV steel structures to 161 kV. The route heads southeast along the existing transmission and pipeline corridor to just east of County Highway E.
	28	1.8	This segment is a continuation of Segment 11, consisting of an upgrade of the 69 kV line on the 345/69 kV steel structures to 161 kV. Approximately a quarter mile east of County Highway E, the route turns south and continues to follow the existing transmission and pipeline corridor for 1.5 miles past Upper Holly Lake and Lower Holly Lake.
	29	0.5	This segment is a continuation of Segment 12, consisting of an upgrade of the 69 kV line on the 345/69 kV steel structures to 161 kV. Between Lower Holly Lake and Ham Lake, the route turns southeast and continues to follow the existing transmission and pipeline corridor to the point south of Ham Lake where the existing 69 kV line splits from the 345 kV line.
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 100 foot ROW <u>Proposed</u> Single circuit 161 kV line on new weather steel davit arm structures within existing ROW	30	1.8	Directly south of Ham Lake, the route turns southeast and follows the existing 69 kV line corridor as it splits from the 345 kV line. The proposed single circuit 161 kV line would be within the existing ROW crossing the Flambeau River State Forest, entering the LCO Reservation, and continuing to the intersection with the 69 kV tap line from the Edgewater Pumping Station.
<u>Existing</u> 161 kV structures <u>Proposed</u> Single circuit 69 kV line on horizontal line post wood or light duty steel structures on 50 foot additional ROW (no overlap with existing)	35	1.1	Exiting the Stone Lake Substation to the east and then turning south crossing under the ATC 345 kV line and the proposed 161 kV circuit, this segment parallels the east side of the existing 161 kV transmission line for the majority (0.9 miles) of its length. When the 161 kV transmission line turns west, the segment continues south to McLeod Road.

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Single circuit 69 kV line on horizontal line post wood or light duty steel structures on 50 foot ROW	36	0.5	South of McLeod Road, this segment parallels the east side of Kellner Road for approximately one-half mile. At the southern end of this segment, the 69 kV route turns to the west (Segment 40) at the same point where a tap line to the Sand Lake Substation turns to the east (Segment 37).
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Double circuit 69/69 kV line on horizontal line post steel structures on 50 foot ROW	37	0.5	The 69/69 kV line heads east along quarter-section field lines for approximately one-half mile, where it meets the existing 345/69 kV structures and then heads south, as described above in Segments 23 and 24. This segment is part of the in/out line from the 69 kV mainline to the Sand Lake Substation.
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Single circuit 69 kV line on horizontal line post wood or light duty steel structures on 50 foot ROW	40	2.7	The 69 kV route turns west from N. Boylan Road, following a half-section field line for approximately one-half mile. The line then turns south, continuing to follow half-section field lines, crossing W Boylan Road and State Highway 70 as it runs to County Road F.
	41	3.5	The 69 kV alignment turns east on the north side of the County Road F for approximately 0.2 miles to avoid a residence, then crosses to the south side of County Road F and continues east for approximately 0.8 miles. At the intersection of County Road F and Dump Lane, the route turns south to run along the east side of Dump Lane for approximately one mile to Pank Road, where it turns east and runs along the north side of Pank Road for approximately 1.5 miles to the intersection with Railroad Lane.
	42	0.7	This segment follows Railroad Lane south from Pank Road for approximately three-quarters of one mile to the ROW owned by CP Railway.
	43	1.6	This segment turns east, paralleling the north side of the CP Railway ROW for approximately 1.5 miles to the intersection of County Road F and Strand Road.

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Single circuit 69 kV line on horizontal line post wood or light duty steel structures on 50 foot ROW	44	0.9	At the intersection of County Road F and Strand Road, the 69 kV line turns east to run along the north side of Strand Road to the 345 kV transmission line and pipeline ROW on the border of the LCO Reservation.
<u>Existing</u> 345 kV steel structures on 120 foot ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures, parallel to the pipeline and 345 kV structures on 50 foot new ROW	45	0.2	This segment turns south and parallels the 345 kV transmission and pipeline ROW to a point west of the Edgewater Pumping Station, where the line turns east.
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures on 50 foot- ROW	46	0.6	This segment consists of a single circuit 69 kV line on Enbridge-owned property that runs east from the 345 kV line to the Edgewater Pumping Station.
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 75 foot ROW <u>Proposed</u> No changes – existing tap line maintained	Same as Preferred Route		
	15A	1.4	This segment maintains the existing H-frame 69 kV tap line serving the Edgewater Pumping Station

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 75 foot ROW <u>Proposed</u> 69 kV tap line rebuilt on new wooden or light duty steel structures within existing ROW	15C	<0.1	This short 69 kV segment would connect the north end of the existing tap line from the Edgewater Pumping Station to the main transmission corridor along existing ROW; the segment passes under the 161 kV line to end at a dead-end structure
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100' ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures; parallel single circuit 69 kV line on new wooden or light duty steel structures within existing ROW	16B	0.1	For this short segment, the 69 kV and 161 kV lines proceed east along the existing ROW on separate parallel structures from the 69 kV Edgewater Pumping Station tap line to the point where the lines go on double-circuit structures.
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures within existing ROW	Same as Preferred Route		
	16C	3.9	From approximately 560 feet east of the tap to the Edgewater Pumping Station, the proposed double circuit 161/69 kV line would continue southeast along existing ROW to the intersection with County Highway C.
	17	5.0	This segment is a continuation of Segment 16C. The proposed double circuit 161/69 kV line continues along existing ROW, crossing State Highway 27/70 and the Couderay River as it runs to a point approximately 0.5 miles north of the proposed Radisson Substation.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures on 100 foot ROW	Same as Preferred Route		
	18A	0.3	This segment would be a continuation of Segment 17. The proposed double circuit 161/69 kV would turn south off of the existing corridor and follow field lines along new ROW to the alternate location for the Radisson Substation site south of Polish Road.

Alternate Route A			
Existing/Proposed Configuration	Segment	Length (miles)	Description
	18B	0.3	This segment would be a continuation of Segment 18A, heading south to the preferred location for the Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures on 50 foot ROW	Same as Preferred Route		
	18C	0.1	This segment would connect the 69 kV line into the preferred Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures on 100 foot ROW	Same as Preferred Route		
	18D	<0.1	This segment would connect the 161 kV line into the preferred Radisson Substation site
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100 foot ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel horizontal line post structures within existing ROW	Same as Preferred Route		
	71	0.1	This segment would extend south from the Stacik Substation to the connection point to the alternate site for the new Radisson Substation
	72	0.3	This segment would be a continuation of Segment 71, connecting to the preferred site for the new Radisson Substation

Alternate Route B:

Alternate Route B presents an alternative location for the 161 kV link between the Stone Lake Substation and the Radisson Substation. This alternative would not utilize the existing ROW agreement with the LCO Tribe nor require BIA approval. In general, the existing 69 kV line would remain in its current location between the Stone Lake Substation and a point just south of Lower Holly Lake, with the new 161 kV line being placed on new structures between the Stone Lake Substation and just south of Lower Holly Lake. Approximately 1.6 miles of this section would be adjacent to the existing 345/69 kV structures, with the remaining 3.4 miles being located along new ROW. The two lines would be placed on 161/69 kV double circuit structures from just south of Lower Holly Lake, around the south edge of the LCO Reservation, to the point where the existing 69 kV line crosses Smith Road; approximately 4.5 miles of this section

would be adjacent to the existing 345 kV structures, and 8.3 miles would be along new ROW. Alternate Route B is the same as the Preferred Route from the point where the existing 69 kV line crosses Smith Road to the Radisson Substation.

Alternate Route B is comprised of the following segments: 3, 17, 18A, 18B, 18C, 18D, 46, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73A, 73B, and 74, which are depicted in Appendix B-3.

Table 2.1-3, below, provides more detail on existing and proposed structures and transmission ROW for each segment of this route. More information can also be found in Sections 2.3 and 2.4, below.

Table 2.1-3. Segment Descriptions for Alternate Route B

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> 69 kV lines entering Stone Lake Substation on 50 foot ROW <u>Proposed</u> Single circuit 69 kV line on existing structures	73A	0.3	This segment exits the Stone Lake Substation to the east and proceeds along existing 69 kV structures for approximately 940 feet, where it jogs south and passes under the proposed 161 kV line (Segment 73A) and continues east to the point where it joins the 161 kV line at Segment 74. This segment includes the structure that is the tap point into the Stone Lake Pump Station (tap will be maintained)
<u>Existing</u> None – proposed transmission ROW will overlap with existing 69 kV line ROW described for Segment 1B <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures (requiring 50 foot additional ROW for 100 foot total ROW width)	73B	0.2	This segment exits the Stone Lake Substation to the east and proceeds north, to a point south of Boylan Road, where it heads east for approximately 430 feet, crossing over the 69 kV line (Segment 73A) before reaching the point where it joins the 69 kV line at Segment 74.

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on steel structures on 75 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on new steel structures (requiring 50 foot additional ROW for 100 foot total ROW width)	74	0.2	Once joined by the 69 kV line east of the Stone Lake Pump station, this segment is a double circuited 161/69 kV line running on the south side of Boylan Road along existing ROW, south of the existing double circuit line that is directly adjacent to the road.
<u>Existing</u> Single circuit 69 kV line on steel structures with 100 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on steel structures on existing (100 foot) ROW	Same as Preferred		
	3	0.5	The proposed double circuited 161/69 kV line turns south off Boylan Rd and follows the existing ROW to the juncture with the existing ATC 345 kV transmission line.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Maintain double circuit 345/69 kV line on steel structures; new 161 kV line on davit arm steel structures (requiring 65 foot additional ROW for 185 foot total ROW width)	50	1.0	There would be no changes to the existing 69 kV line on the 345/69 kV structures south of the junction with the 345 kV line. The 161 kV line would be placed on new single circuit structures paralleling the 345/69 kV line. These structures would be approximately 75 feet east of the existing structures, centerline to centerline, sharing approximately 35 feet of ROW.
	51	0.2	This segment is a continuation of Segment 50. The single-circuit 161 kV line is located on new structures paralleling the 345/69 kV line. These structures would be approximately 75 feet east of the existing structures, centerline to centerline, sharing approximately 35 feet of ROW.
<u>Existing</u> Double circuit 345/69 kV line on steel structures on 120 foot ROW	56	0.3	This segment connects the 69 kV line with the existing Sand Lake Substation. The 69 kV line continues to be double circuited with ATC's 345 kV line along this segment.
	57	1.3	Exiting the Sand Lake Substation to the south, this segment involves no change to the existing 69 kV line on the 345/69 kV structures.

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Proposed</u> No change– 69 kV maintained on 345/69 kV structures	58	0.2	This segment is a continuation of Segment 57 that runs to the junction with the proposed single circuit 161 kV line of Segment 54 (below); it involves no change to the existing 69 kV line on the 345/69 kV structures.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures with 100 foot ROW	52	0.8	This segment would be a single-circuit 161 kV line on new single pole steel structures. The line turns east from Segment 51, running along field lines and crossing State Highway 27 to the Enbridge pipeline corridor.
	53	0.3	The 161 kV line turns southeast at the junction with the Enbridge pipeline, paralleling the southwest side of the pipeline corridor.
	54	0.6	This is a continuation of Segment 53, with the single circuit 161 kV line continuing to parallel the southwest/west side of the Enbridge pipeline to the junction with the 345/69 kV line.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> Maintain double circuit 345/69 kV line on steel structures; new 161 kV line on parallel davit arm steel structures (requiring 65 foot additional ROW for 185 foot total ROW width)	55	0.4	At the juncture of Segments 54 and 58, the 161 kV line would be placed on new single circuit structures paralleling the 345/69 kV line and pipeline corridor to just east of County Road E, at which point the 161 kV line turns south. The 161 kV structures would be approximately 75 feet north of the existing structures, centerline to centerline, sharing approximately 35 feet of ROW. The 69 kV line would be maintained on the existing structures. At the eastern end of the segment, the 161 kV line will be on self supporting steel 2-pole structures on either side of the underpass of the 345 kV line.
<u>Existing</u> Double circuit 345/69 kV line on steel structures with 120 foot ROW <u>Proposed</u> No change – 69 kV maintained on 345/69 kV structures	60	1.8	This segment maintains the 69 kV line on the 345/69 kV structures, continuing east of County Road E and then south along the existing transmission and pipeline corridor past Upper Holly Lake and Lower Holly Lake. At this point the 69 kV line would leave the existing structures and turn west to Segment 61.

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None <u>Proposed</u> Single circuit 69 kV line on horizontal line post wood or light duty steel structures on 50 foot ROW	61	0.1	This short segment turns west off of the 345/69 kV transmission line and connects to the proposed single circuit 161 kV line along Segment 62.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures; two 161 kV H-frame structures for underpass of 345 kV structures; 100 foot ROW	62	1.7	At the junction of County Road E and Thors Lane, the single circuit 161 kV line turns south, paralleling County Road E. The line continues south along the east side of County Road E to a point just north of State Highway 27/70, where it crosses to the southwest corner of the intersection to avoid commercial and residential buildings. The segment then immediately crosses back to the east side of County Road E and proceeds south past the junction with County Road F to the intersection with the proposed 69 kV line on Segment 61.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures on 100 foot ROW	63	2.5	This segment would be a double circuited 161/69 kV line on single pole steel structures paralleling County Road F. This segment requires the acquisition of new ROW adjacent to County Road F on the west side of the road.
	64	0.9	At the intersection of County Road F and Strand Road, the 161/69 kV line turns east along the north side of Strand Road and runs to the 345 kV transmission line and pipeline ROW on the border of the LCO Reservation.
<u>Existing</u> 345 kV steel structures with 120 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures parallel to the pipeline and 345 kV structures on 100 foot new ROW	65	0.2	This segment would turn south and parallel the 345 kV transmission and pipeline ROW to a point west of the Edgewater Pumping Station, where the proposed new 69 kV tap line to the Pump Station turns east.

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures on 50 foot ROW	Same as Alternate Route A		
	46	0.7	This segment would be a single circuit 69 kV line on Enbridge-owned property that runs east from the 345 kV line to the Edgewater Pumping Station.
<u>Existing</u> 345 kV steel structures with 120 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures parallel to the pipeline and 345 kV structures on 100 foot new ROW	66	2.3	Continuing to parallel the west side of the Enbridge pipeline and ATC's 345 kV transmission line corridor, this segment would be a double circuit line on single pole structures. The segment spans Summit Lake and extends to the point where the pipeline and 345 kV line turn east.
	67	1.9	Continuing to parallel the pipeline and ATC's 345 kV transmission line corridor on the south side, this segment would be a double circuit line on single pole structures. The segment extends to the point where the pipeline and 345 kV line turn south. . The eastern end of the segment will be on a dead-end structure to pass under the 345 kV line.
<u>Existing</u> None - no transmission ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures on 100 foot ROW	68	2.8	This segment is a continuation of Segment 67, running east along and outside the LCO Reservation boundary. The segment runs cross country for 0.9 miles, and then runs along the south side of W Ortwig Lane, which is south of the Beverly Lake Fishery Area. At County Road C, the segment turns north, paralleling the road for approximately half a mile. The western end of the segment will be on a dead-end structure to pass under the 345 kV line.
	69	0.8	This segment is a continuation of Segment 68, running north along County Road C. To avoid a small cluster of rural residences on the west side of the road, this segment turns to run approximately 400 to 600 feet further west of the road, behind the houses.
	70	0.8	This segment is a continuation of Segment 69, rejoining the west side of County Road C as it runs north and crosses the Couderay River and State Highway 27/70, to the junction with the existing 69 kV corridor.

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures with 100 foot ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures within existing ROW	Same Route as Preferred Route		
	17	5.0	From the intersection of County Road C and the existing corridor, the proposed double circuit 161/69 kV line would turn southeast along existing ROW, cross State Highway 27/70 and the Couderay River, and run to a point approximately 0.5 miles north of the proposed Radisson Substation.
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Double circuit 161/69 kV line on davit arm steel structures on 100 foot ROW	Same as Preferred Route		
	18A	0.3	This segment would be a continuation of Segment 17. The proposed double circuit 161/69 kV would turn south off of the existing corridor and follow field lines along new ROW to the alternate location for the Radisson Substation site south of Polish Road.
	18B	0.3	This segment would be a continuation of Segment 18A, heading south to the preferred location for the Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel structures on 50 foot ROW	Same as Preferred Route		
	18C	0.1	This segment would connect the 69 kV line into the preferred Radisson Substation site
<u>Existing</u> None – no transmission ROW <u>Proposed</u> Single circuit 161 kV line on davit arm steel structures on 100 foot ROW	Same as Preferred Route		
	18D	<0.1	This segment would connect the 161 kV line into the preferred Radisson Substation site

Alternate Route B			
Existing/Proposed Configuration	Segment	Length (miles)	Description
<u>Existing</u> Single circuit 69 kV line on wooden H-frame structures on 100 foot ROW <u>Proposed</u> Single circuit 69 kV line on wooden or light duty steel horizontal line post structures within existing ROW	Same as Preferred Route		
	71	0.1	This segment would extend south from the Stacik substation , to the connection point to the alternate site for the new Radisson Substation
	72	0.3	This segment would be a continuation of Segment 71, connecting to the preferred site for the new Radisson Substation

2.1.2.1 Size of Lines and Transmission Line Configuration

Voltage

As described above, Xcel Energy proposes adding a 161 kV transmission line to the existing 69 kV line between the Stone Lake and Couderay Substations. Depending on the final route selected, the Project would involve rebuilding portions of the existing 69 kV line to double circuit 161/69 kV, maintaining the existing 69 kV conductor on the 345/69 kV structures or upgrading it to 161 kV, and constructing new single circuit 69 kV, double circuit 69/69 kV, or 161 kV transmission lines.

Shield Wires

For all new structures, the shield wire will consist of a steel stranded cable and/or aluminum stranded cable containing a fiber optic bundle core (generally known as optical ground wire or OPGW). OPGW allows both lightning protection and a communication path between substations. For single circuit 69 kV, double circuit 69/69 kV, or single circuit 161 kV lines, one OPGW will be installed. For all 161/69 kV double circuit structures, two shield wires will be used: one OPGW and one standard 3/8-inch, seven-strand extra high strength (EHS) steel cable. The existing shield wires will remain in place for any upgrades to the existing 345/69 kV structures.

Size of Conductor

- **161 kV circuit:** The 161 kV transmission line would use a single 795 kcmil 26/7 “Drake” aluminum conductor steel supported (ACSS) conductor or equivalent per phase.
- **69 kV circuit:** All rebuilt 69 kV circuits would use a single 477 kcmil 26/7 “Hawk” aluminum conductor steel reinforced (ACSR) conductor or equivalent per phase. The existing 69 kV line on the 345/69 kV structures uses a 477 kcmil 26/7 “Hawk” ACSR conductor; this conductor would be left in place for Alternate Route B.

Pole Type, Height and Typical Span Length

Engineering drawings of the proposed transmission structures are included in Appendix B-8.

- **161/69 kV double circuit structures:** The double circuit 161/69 kV transmission structures are proposed to be self supporting davit arm steel single pole structures with an average height between 100 and 105 feet and an average span between structures of 550 to 800 feet. All structures within the LCO will be 100 feet or less in height. The visual simulations in Appendix B-9 show the proposed structures within the LCO.
- **161/69 kV double circuit dead-end structures:** The double circuit 161/69 kV dead-end transmission structures are proposed to be self supporting davit arm steel single pole structures with an average height of 100 feet and an average span between structures of 550 and 800 feet.
- **161 kV single circuit structures:** The single circuit 161 kV transmission structures are proposed to be self supporting davit arm steel single pole structures, with an average height of 85 feet and an average span between structures of 550 and 700 feet.
- **161 kV single circuit dead-end structures:** The single circuit 161 kV transmission line will have three different configurations of dead-end structures. The typical style is a self supporting steel single pole structure with an average height of 85 feet and an average span of 550 feet. The other two are designed for locations where the 161 kV line crosses under the 345 kV circuits or over the 69 kV circuits. Both are self supporting steel 2-pole structures. The average height for the type used to cross over the 69 kV line is 95 feet and the average span is 250 feet. The style used to cross under the 345 kV line has an average height of 50 feet and an average span of 250 feet.
- **69 kV single circuit structures:** The single circuit 69 kV transmission structures are proposed to be horizontal line post wood or light duty steel single pole structures, with an average height of 65 feet and average span of 275 feet. Certain locations around the Edgewater Pumping Station will require a single circuit direct embed wood H-frame structure with an average height of 55 feet and typical span between structures of 300 and 500 feet.
- **69 kV single circuit angled structures:** The single circuit 69 kV transmission structures will have two different types of running angle structures: a guyed single pole direct-embed wood or light duty steel structure, and a self supporting single pole steel structure on a concrete foundation. The average height will be 60 feet with an average span between structures of 275 feet.
- **69 kV single circuit dead-end structures:** The single circuit 69 kV transmission structures will have four different configurations of dead-end structures. The two principal configurations are a guyed single pole direct-embed wood or light duty steel structure and a self-supporting single pole steel structure on a concrete foundation. Their average height will be 60 feet with an average span between structures of 275 feet. Two other configurations will be used to cross under other transmission lines: a direct-embed 2-pole steel structure with an average height of 35 feet and average span of 100 to 150

feet, and a direct-embed guyed 3-pole wood or light duty steel structure with an average height of 55 feet and average span of 275 feet.

- **69/69 kV double circuit structures:** For the double circuit 69/69 kV in/out feed to the Sand Lake Substation, a direct-embed horizontal line post steel single pole structure is proposed, with an average height of 60 feet and an average span of 260 feet.

Conductor Support System

The conductor support systems would consist of:

- Glass I-string or polymer suspension insulators for 161 kV and 161/69 kV tangent and angle poles;
- Polymer horizontal post insulators for 69 kV tangent and angle poles; and
- Glass insulators for dead-end poles.

Foundations

The majority of the 161 kV and 161/69 kV structures are expected to be installed on drilled pier concrete foundations if soil conditions permit. In poor soil conditions, driven steel pile foundations or vibratory steel caissons may be required. Foundations for steel pole structures (161 kV, 161/69 kV, and dead-end 69/69 kV structures) require excavating or auguring a hole approximately 20 to 40 feet deep and approximately 5 to 8 feet in diameter. Excavation dimensions would depend upon soil conditions.

The wooden or light duty steel 69 kV single circuit and tangent 69/69 kV double circuit structures are expected to be direct embedded, to a depth of 8 to 11 feet for the 69 kV single circuit structures and to a depth of 10 to 14 feet for the 69/69 kV double circuit structures. In areas with poor soil conditions, the structures are direct embedded in steel culverts backfilled with crushed rock. Culvert dimensions would depend upon soil condition, but are expected to range from approximately 8 to 14 feet deep and approximately 3 to 4 feet in diameter.

2.1.2.2 Configuration and Right of Way

The figures in Appendix B, and Table 2.1-2 and Table 2.1-3 above present the configuration for the alternative routes. The ROW for all 161 kV and 161/69 kV transmission lines proposed as part of this Project is 100 feet; the ROW for all proposed 69 kV and 69/69 kV transmission lines is 50 feet. For the portions of the routes where new 69 kV or 161 kV structures are adjacent to existing 345/69 kV structures, the ROW would be reduced to the extent feasible to minimize impacts to adjacent landowners. The visual simulations in Appendix B-9 show an example of segments with 69 kV structures adjacent to 345/69 kV structures. Transmission line ROW requirements are addressed in more detail in Section 2.4.1 below.

2.1.3 Transmission Studies

A load-serving study and addendum were done to detail the need for this Project. The 2008 Northwest Wisconsin Load-Serving Study that was performed in support of this proposal is located in Appendix D. The study reports the results for system normal conditions (Section 2.1.3.1), single contingencies (Section 2.1.3.2), and alternative transmission network solutions

(Section 2.1.3.3). An analysis of electrical losses is provided in Section 2.1.3.4 below. The 2011 Addendum to the 2008 Study is included in Appendix D and confirms the continuing need for the Stone Lake to Couderay Project.

The study and addendum show that a new 161 kV connection between the Stone Lake and Couderay substations (Option H in the 2008 Study) successfully solves the identified need. This is also the low cost option to meet the need. In addition, the Project facilitates extending the 161/69 kV double circuit line east to the Osprey Substation to serve new pumping load anticipated in 2015. The 161 kV line extension to Osprey is discussed in the 2011 Addendum, located in Appendix D.

2.1.3.1 System Normal

The principal power sources for the Northwest Wisconsin transmission system are served mostly by the 345/161 kV connection at the Stone Lake Substation and the Bayfront Generators. Other various generators (hydro and combustion turbines) and smaller transmission ties also bring power into this area. There are no problems serving load under normal power system contingencies.

2.1.3.2 Single Contingencies

The analysis of the Northwest Wisconsin transmission system was performed on the MRO 2007 Series 2012 and 2017 summer peak model. Load in this region is mainly served by a 69 kV line connecting the Stone Lake and Osprey substations.

The critical thermal overloads identified by the study are the Stone Lake 161/69 kV transformer and the Stone Lake Pump-Sand Lake 69 kV line. Both overloads are present under single contingency conditions (N-1). The voltage issues addressed by the study are on the Ironwood and Gogebic 34.5 and 88 kV systems and the Osprey and Stone Lake area 69 kV system. The system deficiencies uncovered by the study are listed below in Table 2.1-4 and Table 2.1-5. The deficiencies labeled “2017” shows up in the 2017 model but not in the 2012 model. Deficiencies labeled 2012 are limiters in both the 2012 and the 2017 models.

Table 2.1-4: System Loading Deficiencies

Year	Monitored Element	Contingency	Continuous Rating (MVA)	Contingent Flow (MVA)	Loading Level (%)
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn 161 kV	70	85.6	122
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn-Gingles 161 kV	70	85.9	123
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV	48	53.1	111
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV	48	53.1	111
2012	Whitetail-Big Falls 69 kV	Stone Lake Pump-Sand Lake 69 kV	48	70.7	147
2012	Whitetail-Trails End 69 kV	Stone Lake Pump-Sand Lake 69 kV	48	52.9	110
2017	Stone Lake Pump-Sand Lake 69 kV	Whitetail-Osprey 69 kV	48	56.8	118

Table 2.1-5: System Voltage Deficiencies

Year	Contingency*	Bus	Voltage
2012	Loss of Gingles-Hurley 115 kV line	Mine Road 34.5 kV	0.888
2012	Loss of Ironwood-Park Falls 115 kV line	Mine Road 34.5 kV	0.859
2012	Loss of Stone Lake-Farmers Inn 161 kV line	Herb Street 34.5 kV	0.898
2012	Loss of Farmers Inn-Gingles 161 kV line	Herb Street 34.5 kV	0.898
2012	Loss of Stone Lake-Farmers Inn-Gingles 161 kV line	Herb Street 34.5 kV	0.900
2012	Loss of Whitetail-Osprey 69 kV line	Whitetail 69 kV	0.837
2012	Loss of Stone Lake Pump-Sand Lake 69 kV line	Sand Lake 69 kV	0.455
2017	Loss of Sheldon Pump-Holcombe 115 kV line	Herb Street 34.5 kV	0.899

* Only the lowest voltage was listed per contingency

2.1.3.3 Alternative Transmission Network Solutions

The 2008 Study analyzed eight transmission options to meet the system deficiencies identified above. The 2011 Addendum was prepared to update the 2008 Study's conclusions with the most recent available data. A summary of the benefits and limitations of the options studied is presented below, with supporting detail in the 2008 Study and 2011 Addendum in Appendix D.

Options Adding 115 kV Transmission

Four of the eight options added 115 kV transmission to address the overloading and voltage deficiencies of the current system in the Stone Lake-Osprey area:

- Option A- Prentice Clear Lake 115 kV Line

- Option B- Prentice-Highway 8 115 kV Line
- Option C- Prentice-Tomahawk 115 kV Line
- Option G- Ironwood-Gogebic 115 kV Line, with Gogebic-Watersmeet-Lakota Road 138 kV Line

The benefits of Options A, B, and C are that they address several of the low voltage issues in the ATC control area and fix the Stone Lake Pump-Sand Lake 69 kV overload. However, Options A, B, and C do not address the Stone Lake 161/69 kV transformer issues, however, nor do they address the low voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses. These options are therefore not considered viable options.

Option G is not considered a viable option because it does not address any of the overload and voltage deficiencies in the Stone Lake-Big Falls area.

Option of Reconductoring 69 kV Line

In light of the critical thermal overloads of the Stone Lake 161/69 kV transformer and the Stone Lake Pump-Sand Lake 69 kV line, the option of reconductoring the Stone Lake-Edgewater Pump 69 kV line was studied (Option E). While the 69 kV reconductoring fixes the Stone Lake Pump-Sand Lake 69 kV overload, it does not address the Stone Lake 161/69 kV transformer issues, nor the low voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses. As a result Option E is not a viable option to address the system deficiencies in the Stone Lake-Big Falls area.

Options Adding 161 kV Transmission

Three options were considered that added 161 kV transmission to the Stone Lake-Osprey area:

- Option D- Big Falls-Stone Lake 161 kV Line
- Option F- Stone Lake-Edgewater 161 kV Line
- Option H- Stone Lake-Couderay 161 kV Line

While Options D and F addressed the critical Stone Lake 161/69 kV transformer loading issues, neither was deemed viable in comparison to Option H.

Option D is not considered viable because of expense. While the addition of a 161 kV line between Big Falls and Stone Lake fixes the overloading of the Stone Lake 161/69 kV transformer and the Stone Lake Pump-Sand Lake 69 kV line, the length of this option is roughly three times that of Option H's Stone Lake-Couderay 161 kV line. In addition, the Big Falls-Stone Lake 161 line does not address the overload or voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses unless a 161/69 kV transformer is added at the Couderay Substation as Option H does. The longer line length and added transformer makes Option D roughly two and one-half times more expensive than Option H without delivering appreciably greater electric performance.

Like Option D, Option F fixes the Stone Lake Pump-Sand Lake 69 kV line and Stone Lake 161/69 kV transformer overload issues. But this option only addresses the Stone Lake 161/69

transformer loading issues through 2015, and does not address the low voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses.

In contrast, Option H addresses all low voltage issues resulting from the outages of the Stone Lake Pump to Sand Lake 69 kV and Whitetail-Big Falls 69 kV lines, and fixes the Stone Lake Pump-Sand Lake 69 kV and Stone Lake 161/69 kV transformer overloading issues. Table 2.1-6, below, details all the thermal overloads addressed by Option H. This option successfully mitigates all area needs and is the least cost option to do so.

Table 2.1-6: Thermal Overloads Alleviated by Option H

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Whitetail-Big Fall 69 kV
2012	Whitetail-Trails End 69 kV	Stone Lake Pump-Sand Lake 69 kV
2012	Big Falls-Whitetail 69 kV	Stone Lake Pump-Sand Lake 69 kV
2012	Stone Lake 161/69 kV	Stone Lake-Farmers Inn 161 kV
2012	Stone Lake 161/69 kV	Stone Lake-Farmers Inn-Gingles 161 kV
2017	Holcombe-Cornell 115 kV	Gingles-Hurley 115 kV
2017	Holcombe-Cornell 115 kV	Bayfront-Gingles 115 kV

2.1.3.3.1 Regional Studies

The facilities in this application are proposed to address local load-serving reliability issues. For this reason, regional studies were not performed for this Project.

2.1.3.3.2 Reliability and Performance Benefits

The addition of a 161 kV line between the Stone Lake and Couderay Substations (Option H) is the only option that successfully addresses all of the Stone Lake area concerns. There will be a strong source into the 69 kV line system between Stone Lake and Big Falls to allow this area to operate successfully under contingency.

2.1.3.3.4 Electrical Losses for Each Alternative, Peak MW, and GWh Estimates

New transmission lines added to the electric system affect the resistive losses of the system. In turn, the costs for capacity and energy for the system are affected. If adding a new transmission line reduces losses, capacity and energy costs are reduced. Loss effects have been analyzed for the Project study alternatives, as shown below.

Table 2.1-7: Electrical Loss Comparison – Study Alternatives

Option	Loss Change 2012 (MW)	Loss Change 2017 (MW)
A	+ 0.1	-0.3
B	-0.1	-0.6
C	-0.7	-1.1
D	-6.4	-6.3
E	-2.0	-2.1
F	-2.4	-2.1
G	+2.3	-1.6
H	-2.9	-2.8

Loss effects have also been analyzed for the Project Route Alternatives, as shown below.

Table 2.1-8: Electrical Loss Comparison – Route Alternatives

Route	Loss Change 2012 (MW)	Loss Change 2016 (MW)
Preferred	-1.5	-0.9
Alternate A	-1.5	-0.9
Alternate B	-1.5	-1.0

2.1.3.5 Short Circuit, Stability and Thermal Analyses

The proposed Project does not involve new generation facilities or the installation of significant reactive sources. The existing transmission system is known to be stable and without fault duty problems, so short circuit and stability analyses were not undertaken in the study of alternatives. Xcel Energy will continue to study short circuit, stability, and thermal issues for the Project area through annual transmission studies.

2.1.3.6 Distribution Substations, Need and Alternatives Considered

No new distribution-specific substations are proposed as part of this application. The Sand Lake Substation is a small distribution substation located south of the Stone Lake Substation, delivering power to nearby rural residencies and farmsteads. The Edgewater Pumping Station provides power to Enbridge for their pump loads. No changes to the Sand Lake Substation or Edgewater Substation are proposed.

Due to size constraints at the Couderay Substation, a new substation (Radisson Substation) to be located across the road from Couderay Substation and just south of NWECC's Stacik Substation is proposed for the 161/69 kV connection in the area. The Stacik Substation is currently supplied from the Couderay Substation, and would instead be supplied by the new Radisson Substation under the proposed Project. The Couderay Substation would be removed.

2.1.3.7 Data Input Files

The Data Input Files used in the 2008 Study are included in the Study in Appendix D and will be provided electronically to PSCW staff.

2.1.4 Substation Facilities

This Project includes the construction of a new 161/69 kV substation to be named Radisson Substation to replace the existing Couderay Substation. The new substation will be located in Section 20 of Radisson Township, south of Polish road, across the road from the Couderay Substation. The major components of the initial Radisson Substation project would consist of:

- One 161-69 kV, 70 MVA autotransformer
- One 161 kV line termination
- Three 69 kV line terminations
- Associated 161 kV bus, disconnect switches, switch stands and bus support, with drilled pier foundations planned for all support structures
- Associated 69 kV bus, disconnect switches, switch stands, and bus supports, with drilled pier foundations planned for all support structures
- One 161 kV circuit breaker with associated control cables and foundations
- One 69 kV circuit breaker with associated control cables and foundations

Approximately 6 acres would be graded during initial construction of the substation, with the dimensions of the fenced area being approximately 400 feet by 320 feet (2.9 acres). Actual dimensions will depend on final engineering and negotiations with landowner to minimize impact.

In addition to the construction of the new Radisson Substation, the Project would also involve an upgrade to the existing Stone Lake Substation in Section 5 of Bass Lake Township. The upgrades, would involve installing the following equipment within the substation's existing fenced area: a 161 kV line termination, a 161 kV breaker, a motor operated disconnect switch, and a motor operator on the existing switch to create a sixth position in the existing 161 kV ring bus.

No significant modifications are anticipated at the Sand Lake Substation, or the Edgewater Pumping Station facility, which will continue to be served by the 69 kV line. Depending on the final route selected, minor changes may occur within the existing footprints of these substations, such as the location of the 69 kV termination structures.

2.1.5 Contractual Agreements

Northern States Power Company, a Minnesota corporation (NSPM) and NSPW (collectively as NSP) entered into an Interchange and Interconnection Agreement (I&I) with NVEC on April 25, 1989. This I&I contains mutually beneficial terms and conditions for coordinating the development and operation of their respective systems through the points of an interconnected system. The I&I identifies the interconnection between the NSP Transmission System and

NWEC Distribution System as the point where NSP's 69 kV Transmission System connects to the NWEC-owned 69 kV transformer at the Stacik Substation.

2.1.6 Transmission Service Agreements

None of the proposed facilities come about as a result of a specific transmission service request. The facilities are being proposed for local reliability needs.

2.1.7 Transmission and Substation Costs

As explained in Section 2.1.3 above, the Project is necessary to ensure continued reliability of the transmission system in Northwest Wisconsin. Therefore, it will not result in annual costs disproportionate to the service value of the work performed or the quantity of available service.

2.1.7.1 Segment Cost Estimate (capital costs; O&M; removal; nodal/transition cost) and

2.1.7.2 Route Cost Estimate (transmission line; facilities (new and upgrades; land/land rights; distribution system modifications; substation construction; total capital costs; removal; salvage; O&M; Expense incl. pre-certification; gross project cost)

Xcel Energy estimates the total cost of the Project to be as follows depending on the route and substation site ordered by the PSCW:

- Preferred Route: \$28,480,000
- Alternate Route A: \$31,280,000
- Alternate Route B: \$35,300,000

Table 2.1-9. Cost Estimate – for Route to Preferred Radisson Substation Site

Project Costs	Preferred Route	Alternate Route A	Alternate Route B
Transmission Line Costs			
Capital Costs - ROW/Easements	\$1,670,000	\$1,460,000	\$2,300,000
Capital Costs – Construction ¹	\$16,105,000	\$19,115,000	\$22,385,000
Capital Costs – Removals/Salvage	\$265,000	\$265,000	\$175,000
Subtotal of Transmission Line Costs for New Route to Radisson Substation Preferred Site	\$18,040,000	\$20,840,000	\$24,860,000
Substation Costs			
Radisson Substation (New 161/69 kV Substation – Preferred Site)			
Capital Costs - ROW/Easements	\$200,000	\$200,000	\$200,000
Capital Costs - Construction	\$7,945,000	\$7,945,000	\$7,945,000
Capital Costs – Removals/Salvage	\$0	\$0	\$0
Operations and Maintenance ²	\$50,000	\$50,000	\$50,000
Sand Lake Substation – No costs	\$0	\$0	\$0
Edgewater Pumping Station – No costs	\$0	\$0	\$0

Project Costs	Preferred Route	Alternate Route A	Alternate Route B
Stone Lake Substation (Install 161 kV Line Termination)			
Capital Costs - ROW/Easements	Not required	Not required	Not required
Capital Costs - Construction	\$1,385,000	\$1,385,000	\$1,385,000
Capital Costs – Removals/Salvage	\$0	\$0	\$0
Operations and Maintenance ²	\$0	\$0	\$0
Couderay Substation (Removal)			
Capital Costs - ROW/Easements	Not required	Not required	Not required
Capital Costs - Construction	\$15,000	\$15,000	\$15,000
Capital Costs – Removals/Salvage	\$95,000	\$95,000	\$95,000
Operations and Maintenance	\$0	\$0	\$0
Subtotal of Substation Costs – assuming Preferred Site for Radisson Substation	\$9,690,000	\$9,690,000	\$9,690,000
Pre-Certification Expense⁵	\$750,000	\$750,000	\$750,000
Total Project Costs – assuming Preferred Site for Radisson Substation	\$28,480,000	\$31,280,000	\$35,300,000

¹ Capital costs include anticipated AC mitigation costs for portions of the routes that parallel natural gas pipeline and railroad

² Operation and Maintenance Costs are required for revisions to substation relay settings and associated testing due to the new transmission line configuration at the Radisson Substation.

⁵ Precertification Expense includes those expenses necessary to perform preliminary design, conduct environmental reviews, and prepare applications to obtain approval from such governmental agencies as the PSC, the WDNR, and the USACE.

Per 2.1.7.2 – this project would not require upgrades to the distribution system, so no costs included.

If the alternate site for the Radisson Substation site is selected, the costs listed above would be the same, with the exception of the capital costs for construction of the site, as shown in the comparison table below. The cost difference is due to the longer access road that would be necessary for the preferred site.

Table 2.1-10. Cost Comparison – Radisson Substation Preferred vs. Alternate Sites

Project Costs	Preferred Site	Alternate Site
Capital Costs - ROW/Easements	\$200,000	\$200,000
Capital Costs - Construction	\$7,945,000	\$7,700,000
Capital Costs – Removals/Salvage	\$0	\$0
Operations and Maintenance ²	\$50,000	\$50,000
Total Radisson Substation Costs	\$8,195,000	\$7,950,000

2.1.7.3 Projects for 345 kV or Greater: N/A

2.1.7.4 Regional Cost Benefit Allocation Analysis

This is a reliability project required to address low voltage issues of the 69 kV system in the area between and around the Stone Lake and Couderay Substations. Given the actual and anticipated growth in demand in this area, failure to address these low voltage issues could result in system outages violating National Electric Reliability Council (NERC) standards for N-1 and N-2 conditions. Because the Project is required to avoid system reliability issues, no cost benefit analysis of the Project was performed. It should be noted, however, that under Xcel Energy's Federal Energy Regulatory Commission-approved (FERC-approved) Open Access Transmission tariff, all electric utility customers who benefit from this Project, not just the Xcel Energy customers located within the Project's immediate vicinity, must pay for use of the Project. This means that Xcel Energy customers alone do not bear the burden of the Project's costs.

2.1.7.5 Electrical Losses and Assumptions

Section 2.1.3.4 provides an analysis of electrical loss savings between the study alternatives and the Route Alternatives for the Project.

2.1.8 Construction Schedule and Constraints

Construction of the Project facilities is scheduled to begin in mid-2013, depending on permit approval. Based on that construction start date, the final component of the proposed Project is proposed to be completed by December 2014. Because existing facilities are critical to the electrical supply of the area and need to be retrofitted to handle the increased load capacity, it will be necessary to construct the proposed Project in phases, taking an existing component out of service for rebuilding and then placing it back into service, and moving onto rebuild the next component and place it back into service. For example, the Edgewater Pumping Station cannot be taken out of service for long durations. But it can be energized from the direction of either the Stone Lake or the Couderay/Radisson substations, allowing Edgewater to be kept in service during the construction phase when the existing 69 kV line on the Stone Lake side of the station is de-energized, as well as during the phase when the existing line on the Couderay/Radisson side is de-energized.

The general construction schedule for various portions of the Project (assuming the Preferred Route is selected) is provided below. These estimated construction time frames include the time necessary to remove the existing 69 kV transmission line structures and clear the ROW.

Construction would start after all necessary permits and approvals have been received for the entire Project.

- File CPCN Application - 3rd quarter 2011
- Receive CPCN Order - 4th quarter 2012
- Substation and Line Design - 1st quarter 2013
- ROW Acquisition - 2013

- Substation Construction - 2nd quarter 2013 – 4th quarter 2014
- Transmission Line Construction - 4th quarter 2013 - 3rd quarter 2014
- Final ROW Contacts and Cleanup - 4th quarter 2014 – 2nd quarter 2015
- Project In-Service Date - 4th quarter 2014

2.1.9 Transmission Tariffs

Xcel Energy provides transmission service in accordance with the Midwest Independent Transmission System Operators (MISO) FERC-approved Open Access Transmission Tariff.

2.2 PROJECT DEVELOPMENT AND ALTERNATIVES

2.2.1 System and Local Level Alternatives

NSPW (hereinafter referred to as Xcel Energy) proposes to upgrade the existing transmission line system between the Stone Lake and Couderay substations in Sawyer County, Wisconsin, by adding a new 161 kV line to the existing 69 kV line between the two substations. Xcel Energy's proposed Stone Lake to Couderay Transmission Project would upgrade the existing transmission line system between the Stone Lake and Couderay Substations in Sawyer County, Wisconsin by adding a new 161 kV line to the existing 69 kV link between the two substations. The Project is necessary to provide adequate and reliable transmission service to the area and will support additional future demand. The specific system and local alternatives investigated in the development of this Project are discussed in Section 2.1.3.3 above.

2.2.2 Route Evaluation Factors

Siting of new transmission lines is a multi-stage process consisting of:

1. Identifying potential route corridors between established end-points that meet the routing priorities defined in Wisconsin Statute § 1.12(6). These priorities- consistent with economic and engineering considerations, reliability of the transmission system, and protection of the environment- include in order of priority:
 - Existing utility corridors;
 - Highway and railroad corridors;
 - Section or field lines; and
 - New corridors
2. Segmenting identified corridors into discrete segments which can be recombined to identify potential transmission line routes. Possible transmission line routes were screened against several criteria to determine the route alternatives. These criteria, which are not prioritized, include to the extent practicable:
 - Minimizing impacts to humans and human settlements, including but not limited to displacement, noise, aesthetics, cultural values, recreation, and public services;
 - Considering effects on public health and safety;

- Considering potential neutral to earth voltage (NEV) impacts to confined animal operations;
 - Following existing ROW (roadway or other utility ROW) or property and/or section lines to minimize impacts to land-based economies, including but not limited to agricultural fields, forested areas, tourism, and mining facilities;
 - Minimizing effects on archaeological and historic resources;
 - Minimizing impacts to rare or endangered species and unique natural resources;
 - Minimizing the total length;
 - Avoiding airports or other land use conflicts;
 - Applying design options that maximize energy efficiencies, mitigate adverse environmental effects, and accommodate expansion of transmission or generating capacity; and
 - Assessing the ability to meet identified or reasonably foreseeable future needs.
3. Soliciting input from local landowners and public officials during the process to identify local issues and concerns with potential transmission line corridors and routes.
 4. Performing a multidisciplinary review and evaluation that considers and balances the quantitative as well as qualitative factors discussed above along with design, engineering, economic, and operational considerations, to identify two routes for each transmission line (69 kV and 161 kV), preferred and alternate, for presentation to the PSCW.

Potential route corridors and evaluated routes are discussed in more detail below and are shown on the maps contained in Appendix B.

2.2.3 Route Corridor Alternatives

Each route alternative for the Project is comprised of several components which would upgrade the link from the Stone Lake Substation to the Couderay/Radisson Substation area to include a new 161 kV line, while also maintaining the 69 kV link between Stone Lake Substation and Couderay/Radisson Substation. The existing 69 kV circuits that provide service to the Sand Lake Substation and Edgewater Pumping Station on the LCO Reservation would also be maintained.

2.2.3.1 Initial Route Identification

Starting in Spring 2010, Xcel Energy began the process of developing existing and potential new route options by collecting Geographic Information System (GIS) data from local, state, and federal agencies. Xcel Energy used this data, along with data collected during field visits to the Project area and input from the LCO Tribe, local and state agencies, and the public to develop an initial base map of potential routes between the Stone Lake Substation and the new Radisson Substation that would replace the Couderay Substation.

The following list is the first round of corridors between the Stone Lake Substation and the Couderay/Radisson Substation area developed by Xcel Energy, shown on the Initial Corridor Map in Appendix B-1:

- Existing 69 kV transmission line between the Stone Lake Substation and Couderay Substation, portions of which are located on the 345/69 kV double circuit line co-owned by ATC and Xcel Energy;
- Existing Enbridge natural gas pipeline corridor from the Stone Lake Substation to the southern boundary of the LCO Reservation, portions of which are adjacent to the 345/69 kV transmission line;
- State Highway 27/70 from Sand Lake on the west side of the LCO Reservation to the crossing of the 69 kV transmission line east of the LCO Reservation;
- County Road F and Strand Road between Lower Holly Lake and the western edge of the LCO Reservation; and
- The ATC 345 kV transmission line/Enbridge pipeline corridor around the LCO Reservation, which runs along the western and southern edges of the LCO Reservation to County Road C, and then north on County Road C to the existing 69 kV line.

These routes were sent to local, state, and federal agencies in June 2010 with requests for comment. Xcel Energy then met with the WDNR and PSCW in August 2010 to discuss these corridors. At this meeting, and in subsequent discussions, the PSCW raised two main concerns with the initial route options identified by Xcel Energy:

- Because the PSCW has no jurisdiction over any route segment within the LCO Reservation and Xcel Energy had not yet reached a ROW agreement with the LCO Tribe, the PSCW requested that Xcel Energy examine the potential for one more route that runs around the LCO Reservation; and
- The PSCW asked Xcel Energy to consider alternate routes that would avoid the lakes area south of Sand Lake.

Given this input from PSCW, Xcel Energy developed additional route options. The expanded options were comprised of individual route segments, typically short linear distances adjacent to roadways, railroads, section or quarter section field lines, and existing utility corridors that could potentially be used for transmission line routes. Xcel Energy focused on identifying additional route options in the following areas:

- **Between Stone Lake Substation and Sand Lake Substation** – In addition to the existing 69 kV route, Xcel Energy identified multiple new route options that generally ran along field lines and roadways to provide an alternative route to continue the 69 kV link to the Sand Lake Substation.
- **Routes to avoid the Ham/Holly Lakes Area** – Xcel Energy identified several route options that would avoid placing new structures adjacent to the 345/69 kV structures in this area, all of which would require transmission lines to be located along new (non-

transmission) ROW. In general, the new route options ran along roads and field lines west of Sand Lake and then turned east along three main options:

- County Road F south of Sand Lake east and continuing south on County Road F to Lower Holly Lake;
 - County Road F east to Dump Lane, Dump Lane east and south to Pank Road, and Pank Road east to County Road F; and
 - CP Railroad Corridor southeast to a point on County Road F south of Hungry Lake.
- **Additional Routes around the LCO Reservation** – Xcel Energy identified several more potential route options on the western and southern sides of the LCO Reservation.
 - On the west side of the LCO Reservation, Marsh Lake Road, County Road F, and a cross country section were identified as possible routes, with interconnecting segments along roads or field lines.
 - On the southern side of the LCO Reservation, a route approximately one mile south of the LCO Reservation boundary was identified. Except for a short distance along Northend Drive, this route was cross country for most of its length because there are little to no existing east-west corridors south of the LCO Reservation for over two miles.
 - On the southeastern side of the Project, two additional east-west route alternatives to the Couderay/Radisson Substation area were identified: one along W. Johnson Road/Old Couderay Rd, and one a mile further south. A significant portion of both of these options would be cross country, as no existing east-west corridors are present.
- **Alternative Routes at southeastern end of Project** – Xcel Energy identified several more potential route options outside of the existing 69 kV transmission corridor for the connection to the Couderay/Radisson Substation area, including connections to the segments around the LCO Reservation listed above. These generally follow roadway corridors.

2.2.3.2 Selecting Final Route Alternatives

Xcel Energy further reviewed the route options based on the routing factors listed above, further field visits, engineering analyses, and continued consultation with the LCO Tribe and other agencies. In December 2010, Xcel Energy entered into an agreement with the LCO Tribe to maintain or upgrade the existing 69 kV transmission line on the current ROW along tribal land within the LCO Reservation.

Three main proposed route alternatives were then identified. Xcel Energy met with township and county officials in January 2011 to discuss all the route alternatives, including route segments. At these local government meetings, no additional route segments were identified by local officials, and the three main routes along with their segments were carried forward to the public outreach meetings that were held to provide the general public information on the

Project. These three main routes and segments are described in detail in Section 2.2.4 below. No additional route segments were identified as a result of public comments received through the outreach meetings.

After the first round of public meetings, Xcel Energy refined the three main route alternatives based on further engineering design considerations, field verifications, and discussions with landowners. These adjustments included:

- Moving a portion of Alternate Route A just south of the Stone Lake Substation, from the west side of Kellner Road to the east side of the existing 161 kV transmission line to minimize impacts to wetlands and homes;
- Moving a portion of Alternate Route A from the north side of County Road F to the south side at a point southwest of Little Sand Lake, to avoid a home located close to the road; and
- Moving a portion of Alternate Route B near Ring Road off the Enbridge pipeline corridor to the west to parallel existing 345/69 kV ROW for approximately 1.25 miles so as to avoid potential neutral to earth voltage impacts to a confined animal location at State Highway 27/Ring Road.

The resulting three route options, including identification of the Preferred Route, were presented to the general public during open houses in May and July 2011.

2.2.3.3 Considered but not Proposed Routes

The following section discusses the routes considered but not proposed, including a summary of the main reasons these were not carried forward as alternatives. Routes considered but not proposed are shown in Appendix B-2.

- **Segments between Stone Lake and Sand Lake Substations** - the routes no longer considered were not carried forward either due to proximity to homes, potential conflicts with distribution lines, and/or proximity to dairy operations that could potentially cause neutral to earth voltage issues to confined animal locations.
- **Segments south of Sand Lake** – these route options were evaluated in light of the concern that the Project avoid the area by Upper and Lower Holly and Ham Lakes, as well as the routing considerations below:
 - County Road F south of Sand Lake – the portion of the County Road F segment east of Dump Lane was not carried forward because of proximity to homes, wetland impacts, and the fact that it would only avoid a part of the lake area, still requiring new structures near Lower Holly and Ham Lakes.
 - CP Railroad Corridor - the majority of the CP Railroad route option was not carried forward due to potential wetland and forest impacts.
 - Pank Road from Railroad Lane to County Road F/Ham Lake – this segment was not carried forward due to potential impacts to homes, and was still in a part of the lake area.

- **Cross country segments between CP Railroad and County Road F** – the cross country segments that run from the CP Railroad northeast of the Rem-Hauer Creek Fishery Area, across County Road F, and along the eastern side of Hungry Lake were not carried forward due to forest and wetland impacts, as well as proximity to homes on the eastern side of Hungry Lake. The cross country segment that runs southeast from the CP Railroad to County Road F was not carried forward due to potential impacts to undisturbed forests and wetlands.
- **Additional Routes around the LCO Reservation** – On the west side of the LCO Reservation, County Road F south of Strand Road was not carried forward due to proximity to homes, and potential impacts to wetlands, forests, and the Benson Creek Fishery Area. Marsh Lake Road was not carried forward due to impacts to undisturbed forest, wetlands, and the area between Summit Lake, Rogers Lake, and the LCO Reservation. On the south side of the LCO Reservation, the cross country route that extends east-west one mile farther south of the LCO Reservation boundary was not carried forward due to potential impacts to undisturbed forest, wetlands, and topography that presents significant engineering constraints.
- **Enbridge natural gas pipeline corridor and State Highway 27/70 within the LCO Reservation** – these segments were not carried forward after consultation with the LCO Tribe in the summer of 2010. The LCO Tribe would not approve a transmission line along the Enbridge natural gas pipeline corridor or State Highway 27/70 through the LCO Reservation. Xcel Energy entered into an agreement with the LCO Tribe in December 2010 to maintain or upgrade the 69 kV transmission corridor ROW.
- **Alternative Routes at southeastern end of Project** – In general, public comments gathered during development of the route alternatives supported keeping the route along the existing transmission ROW in this area of the Project. The routes along Chafer Road, Old Couderay Road, and W. Polish Road were not carried forward due to proximity to homes and potential impacts to wetlands. The two east-west cross country segments that head east from County Road C were not carried forward due to potential impacts to forests and wetlands.

2.2.4 Public Outreach

The Project route identification and selection process involved a multi-faceted approach, which included consideration of state and federal requirements, public comments received at the public outreach meetings, and extensive analysis of appropriate environmental data. Over the course of approximately 18 months, the route development process focused primarily on minimizing the overall impacts of the Project.

Public outreach activities for the Project have consisted of open houses for property owners and local officials near potential routes; individual meetings/communications with interested members of the public; coordination with responsible state and federal public agencies; and direct consultation with LCO Tribe officials and members. Comments on the Project were

solicited at the public meetings, in individual meetings with private landowners, and in mailings to the public, affected landowners and residents, local officials, and tribal officials. Copies of correspondence and informational mailings sent by Xcel Energy to the public and local officials within the Project area and along the proposed routes are included in Appendix F.

On September 1, 2010, Xcel Energy held a meeting with the landowners in the vicinity of the proposed Radisson Substation to introduce them to the Project and solicit input on the location and orientation of the new substation. During this meeting, general agreement was reached on the location of the substation. The landowner of the affected parcel requested Xcel Energy place the substation in such a way as to minimize impacts to the present use of his parcel, which is for hunting and gardening purposes. The adjacent landowners requested that Xcel Energy develop vegetative screening or other methods of minimizing the visual impact of the substation from their homes.

Once the transmission route alternatives were further defined, Xcel Energy held three sets of public open houses in the Project area on February 1-3, 2011, May 12-14, 2011, and July 22, 2011. For the February open houses, all landowners within sections that were one-half a mile from any potential route segment were notified. Maps showing the three main routes along with the other routes considered were available, and the general purpose, need, and schedule for the Project were presented to the public. For the May public meetings, landowners within a half mile of the three proposed route alternatives were notified by individual letters and invited to attend. For the July meeting, landowners within 500 feet of the three proposed routes were notified by individual letters containing maps of their parcels and the associated route segments and invited to attend. At these meetings, refined route maps were available for landowners to review at computer stations. All meetings were advertised in local newspapers and news releases were sent to print, television, and radio media in the Northern Wisconsin area. Additionally, information on the Project, public meeting logistics, and contact and comment information were placed on Xcel Energy's website at:

http://www.xcelenergy.com/About_Us/Transmission/Projects_Directory/Stone_Lake-Couderay_Project.

During these open houses and in subsequent phone and written comments, the public identified several factors that Xcel Energy also considered in the routing process. These factors included:

- Concerns over additional impacts to residences near the existing ATC 345 kV structures;
- Minimizing impacts to agricultural practices near the existing transmission lines by placing any parallel structures as close as possible to existing structures;
- Minimizing the visual and aesthetic intrusion of the transmission line structures and conductors; and
- Minimizing impacts to additional landowners by following the existing transmission line route.

Written comments received from the public are included in Appendix F-2.

2.3 GENERAL TRANSMISSION LINE SITING INFORMATION

2.3.1 through 2.3.6, Various Maps

General Route Maps, Topographic Maps, Land Ownership by Parcel Boundaries, Street Maps, Aerial Photographs, Geographic Information Systems (GIS) Data, GIS Shapefiles, Zoning Maps, Current Land-Use Plans, and Floodplain Maps

The Project area, including identification of the preferred and alternative transmission line routes, other route corridors considered, and the new Radisson Substation site alternatives, is shown on aerial photo base maps in Appendix B, which use the latest aerial imagery available from the United States Geological Survey (USGS). Appendix B-3 shows Wisconsin Wetland Inventory (WWI), and Federal Emergency Management Agency (FEMA) floodplain data, as well as other environmental features, overlaid on National Agriculture Imagery Program 2010 aerial photography. Appendix B-4 contains land cover maps. Appendix B-5 shows the Route Alternatives on USGS Topographic maps. Appendix B-6 contains maps showing current Sawyer County zoning and land-use. Appendix B-7 identifies parcel ownership boundaries based on existing plat map information provided by Sawyer County and includes street maps. Digital GIS shapefile data used for the analysis is provided as part of this application for staff use.

New ROW

Each of the proposed transmission line routes would require the acquisition of new utility ROW. Various route segments, including those segments that would share existing utility ROW, will require the expansion of the existing utility ROW in order to accommodate a safe operating distance for all transmission lines within the corridor.

- **Preferred Route - New ROW**

- 1.5 miles of 69 kV single circuit line along new ROW east of the Sand Lake Substation (Segments 7 and 8);
- 0.6 miles of 161/69 kV structures along new ROW north of the new Radisson Substation, and connection into the Radisson Substation (Segments 18A, 18B, 18C and 18 D);
- 4.5 miles of additional width along existing transmission ROW to accommodate the proposed 69 kV structures adjacent to the existing 345/69 kV double circuit line (Segments 4, 5, 6, 10, 11, 12, and 13);
- 0.2 miles of additional width along existing ROW to construct 161 kV single circuit structures adjacent to existing 69 kV structures (Segment 1A); and
- 0.2 miles of additional width along existing ROW to rebuild the existing 69 kV line to 161/69 kV double circuit structures (Segment 2)

- **Alternate Route A – New ROW**

- 11.7 miles of 69 kV single circuit line along new ROW between the Stone Lake Substation and the Edgewater Pumping Station (Segments 35, 36, 40, 41, 42, 43,

44, and 46; although 0.9 miles of Segment 35 is adjacent to the ROW associated with an existing 161 kV line, no overlap is proposed);

- 0.5 miles of 69/69 kV double circuit structures along new ROW (Segment 37);
 - 0.6 miles of 161/69 kV structures along new ROW north of the new Radisson Substation, and connection into the Radisson Substation (Segments 18A, 18B, 18C and 18 D);
 - 0.2 miles of new ROW adjacent to (but not overlapping with) existing transmission/pipeline ROW to accommodate the proposed 69 kV structures adjacent to the existing 345 kV ATC line and Enbridge natural gas pipeline that are located on the western edge of the LCO Reservation (Segment 45);
 - 0.5 miles of additional width along existing transmission ROW to accommodate the proposed 69/69 kV structures and single circuit 69 kV tap structures adjacent to the 345/69 kV double circuit line to provide continued service to the Sand Lake Substation (Segments 23, 24, 24A and 24B);
 - 0.2 miles of additional width along existing ROW to construct 161 kV single circuit structures adjacent to existing 69 kV structures (Segment 1A); and
 - 0.2 miles of additional width to rebuild the existing 69 kV line to 161 kV single circuit structures (Segment 20).
- **Alternate Route B – New ROW**
 - 0.6 miles of 69 kV single circuit line along new ROW to maintain service to the Edgewater Pumping Station (Segment 46);
 - 0.1 miles of 69 kV single circuit line along new ROW between Lower Holly Lake and the north end of the proposed 161/69 kV structures (Segment 61);
 - 3.4 miles of 161 kV single circuit line along new ROW between the Stone Lake Substation and a point just south of Lower Holly Lake (Segments 52, 53, 54, 62);
 - 8.3 miles of 161/69 kV double circuit line along new ROW between Lower Holly Lake and the new Radisson Substation (Segments 18A, 18B, 63, 64, 68, 69, 70);
 - 1.7 miles of additional width along existing transmission ROW to accommodate the proposed 161 kV structures adjacent to the existing 345/69 kV double circuit line (Segments 50, 51, 55);
 - 4.5 miles of new ROW adjacent to (but not overlapping with) existing transmission/pipeline ROW to accommodate the proposed 161/69 kV structures adjacent to the existing 345 kV ATC line and Enbridge natural gas pipeline that are located on the western and southern edges of the LCO Reservation (Segments 65, 66, 67);
 - 0.2 miles of additional width along existing ROW to construct 161 kV single circuit structures adjacent to existing 69 kV structures (Segment 73B); and
 - 0.2 miles of additional width along existing ROW to rebuild the existing 69 kV line to 161/69 kV double circuit structures (Segment 74).

Rebuild Routes (Existing Fee-Owned and Easement ROW)

All three Route Alternatives contain segments that will be completely built on existing fee-owned property or existing transmission ROW to replace existing transmission line facilities.

- **Preferred Route – Existing ROW**

- 0.2 miles of existing 69 kV structures will be maintained on existing ROW east of the Stone Lake Substation (Segment 1B);
- 5.7 miles of the existing 69 kV conductor that is located on 345/69 kV structures will be removed and replaced with 161 kV conductor within existing ROW (Segments 4, 5, 6, 9, 10, 11, 12, 13);
- 10.9 miles of existing 69 kV H-frame structures will be removed and replaced with 161/69 kV double circuit structures within existing ROW from the point where the existing 69 kV line splits from the 345 kV line to a point 0.6 miles north of the proposed new Radisson Substation (Segments 14A, 14B, 16A, 16C, 17); and
- The 1.4 mile existing 69 kV tap line to the Edgewater Pumping Station would be maintained with no changes, except for the replacement of the northernmost existing structure within existing ROW (Segments 15A and 15B).

- **Alternate Route A – Existing ROW**

- 0.2 miles of existing 69 kV structures will be maintained on existing ROW east of the Stone Lake Substation (Segment 1B);
- 0.5 miles of existing 69 kV structures will be removed and replaced with single circuit 161 kV structures within existing ROW (Segment 21);
- 5.7 miles of the existing 69 kV conductor located on 345/69 kV structures will be removed and replaced with 161 kV conductor within existing ROW (Segments 9, 22, 23, 24, 26, 27, 28, 29);
- 10.9 miles of existing 69 kV H-frame structures will be removed and replaced with 1.8 miles of single circuit 161 kV structures within the existing ROW (Segment 30), and 9.1 miles of 161/69 kV double circuit structures will be placed within existing ROW from the point where the existing 69 kV line splits from the 345 kV line to a point 0.6 miles north of the proposed new Radisson Substation (Segments 16B, 16C and 17); and
- The 1.4 mile existing 69 kV tap line to the Edgewater Pumping Station would be maintained with no changes, except for the replacement of the northernmost existing structure within existing ROW (Segments 15A and 15C).

- **Alternate Route B – Existing ROW**

- 0.2 miles of existing 69 kV structures will be maintained on existing ROW east of the Stone Lake Substation (Segment 74A);
- 5.7 miles of the existing 69 kV conductor that is located on existing 345/69 kV structures will be maintained with no changes and no proposed new adjacent structures (Segments 56, 57, 58 and 60); and

- 5.0 miles of existing 69 kV H-frame structures will be removed and replaced with 161/69 kV double circuit structures within existing ROW from the point where the existing 69 kV line crosses Smith Road to a point 0.6 miles north of the proposed new Radisson Substation (Segment 17).

2.4 DETAILED ROUTE INFORMATION

The impacts resulting from the construction of a new transmission line or upgrades to the existing line along the Preferred and Alternate Route segments between the Stone Lake and Couderay/Radisson substations are discussed and quantified below and shown in Tables 1 through 4 in Appendix A. As described above, several route segments for each route alternative would require the acquisition of new ROW and the expansion of existing utility ROW. For the rebuild and upgrade segments, there would be impacts from the removal of the existing structures and placement of the new structures, and from placing new conductors on the existing and new structures. The only segments that would not involve any impacts would be Segments 56, 57, 58 and 60 for Alternate Route B; these segments consist of the existing 69 kV conductor remaining in place on the 345/69 kV structures, with no new structures parallel to the line.

2.4.1 General Route Impacts

Supporting information quantifying the impacts of the Preferred and Alternate Route segments is provided in Appendix A, Tables 1 through 4.

2.4.1.1 Table 1A ROW Required, New ROW and Corridor Sharing

Table 1A in Appendix A summarizes the amount of existing ROW and new ROW for the three Route Alternatives. The percentage of route acres shared with existing utility or roadway corridors for the Route Alternatives varies from approximately 49% to 87%.

2.4.1.2 Railroad and Pipeline Corridors

Railroad Corridors

None of the proposed alternatives would be located within ROW owned and operated by CP Railway, except for Alternate Route B, which would cross the track in two locations. Of the three alternatives, only Alternate Route A would parallel the mainline railroad track (Segment 43). However, this segment would not share ROW with CP Railway.

When an HVTL is located adjacent to a railway, the railway's tracks and signals may be subject to electrical interference from capacitive, electric and magnetic, and conductive effects.

Capacitive coupling results from the electric field of the transmission lines' conductors coupling with above-ground conductive objects that are insulated from the earth, such as railway tracks that are typically installed on high impedance ballast (the rock bed used to support the tracks). Electric and magnetic induction results from the magnetic field produced by the AC flowing in the conductors of the transmission line coupling with above-ground or below-ground metallic objects, such as railway tracks and buried communications cables. Conductive interference results from fault currents entering the ground and raising the conductive potential of the soil in the vicinity of the railway. If a transmission line is located in proximity and parallel to a railway

for long distances, all these interference mechanisms can cause high currents and voltages to develop on the railway's tracks and communication cables. If the AC interference is above certain thresholds, it can result in personal safety hazards, damage to signal and communication equipment, and false signaling of equipment.

These AC interference effects can be predicted with computer modeling. With proper planning and mitigation management, railways and high-voltage AC transmission lines can be safely collocated. The American Railway Engineering and Maintenance-of-Way Association has specifications for steady state rail-to-ground and equipment-to-ground voltage levels to insure safety of railway operating personnel and the public. The safety criteria established by the American National Standards Institute/Institute of Electrical and Electronics Engineers Standard 80 (Guide for Safety in AC Substation Grounding) is used for fault conditions. In addition, railway signal and equipment manufacturers provide AC interference voltage tolerances for proper signal operation, so nearby transmission facilities can be designed to insure that AC interference levels do not exceed the acceptable safety criteria or equipment voltage tolerance.

Depending on AC interference levels, several mitigation methods may be used. These include reducing the distance between insulated joints in track sections, grounding the railroad's tracks, and burying gradient control wires or matting. It is unlikely that installation of any of these mitigation methods would require additional ROW.

Reducing the distance between insulated joints involves placement of additional joints in existing tracks to shorten track sections. This reduces coupled track area and AC interference voltage levels. Grounding the tracks and communication cables is one of the most effective methods. Typically, this is done at communication and signal cable access points (such as at splice locations and manholes) and other points where the track would have high induced voltage if not grounded. Grounding reduces voltage levels along track sections and provides a path for AC interference currents to flow to ground. Burying gradient control wires or matting is an effective method to mitigate both inductive and conductive interference, by raising the earth's conductive potential in the vicinity of the railroad so that the difference in the potential conductivity of the railroad and the ground is reduced. As a result, rail-to-ground and rail touch voltages are reduced. Gradient control wires or matting consist of one or more bare conductors buried parallel to and near the railroad.

If Segment 43 is selected for the final route, Xcel Energy would insure that the necessary soil resistivity testing and computer modeling of AC interference effects is completed and any required mitigation is designed and installed prior to energizing the transmission line. Preliminary cost estimates for mitigation measures necessary for this segment of Alternate Route A are included in the project costs in Section 2.1.7.

Pipeline Corridors

Enbridge Energy operates an underground natural gas pipeline that is collocated with portions of ATC's 345 kV transmission line, and portions of Xcel Energy's existing 69 kV transmission

line. The following portions of each of the proposed Route Alternatives would parallel pipeline ROW:

- **Preferred Route:** Segments 11 (for a portion of the length), 12 and 13;
- **Alternate Route A:** Segments 27 (for a portion of the length), 28, 29, and 45; and
- **Alternate Route B:** Segments 53, 54, 55, 60, 65, 66 and 67.

When an HVTL is located adjacent to a pipeline ROW, the pipeline may be subjected to electrical interference from electric and magnetic induction, conductive interference, and capacitive effects. Electric and magnetic induction is the primary effect of a high-voltage AC transmission line on a buried pipeline during normal (steady state) operation. This form of interference is due to the magnetic field produced by the AC current flowing in the transmission line's conductors coupling with the metallic pipeline to induce a voltage and associated current on the pipeline.

Conductive interference is a concern when a transmission line fault occurs in proximity to the pipeline, as it can cause AC currents to enter the pipeline at flaws in its coating to produce a voltage gradient across the pipeline coating. Electric and magnetic effects are also a concern during a fault because the phase current in at least one conductor of a high-voltage AC transmission line is elevated.

Capacity effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. To prevent contact shock hazards, it is necessary to maintain the proper horizontal and vertical separation between the transmission line's conductors and the metal equipment used during pipeline construction and maintenance, such as cranes and shovels.

If these electrical interference effects are great enough during normal operation, then a potential shock hazard exists for anyone that touches an aboveground part of the pipeline, such as parts of a valve or cathodic protection test station. In addition, if the induced AC current density at a flaw in the pipeline coating is great enough during normal operation, AC pipeline corrosion may occur. Lastly, damage to the pipeline coating can occur if the voltage between the pipeline and surrounding soil becomes excessive during a fault condition.

With proper planning and mitigation, pipelines and high voltage AC transmission lines can be safely colocated. The National Association of Corrosion Engineers has standards that ensure that pipeline integrity would not be degraded nor personnel safety compromised because of AC interference from a transmission line constructed and operated adjacent to a pipeline. The AC interference effects of the two facilities being adjacent to one another can be predicted with computer modeling. Mitigation techniques for AC interference on pipelines include reducing the impedance of the transmission structure grounds, grounding the pipeline in conjunction with decouplers, burying gradient control wires along the pipeline, burying ground mats under aboveground facilities (such as valves), and using dead fronts at test stations.

Xcel Energy has been meeting and working with Enbridge Energy to identify the exact locations of pipeline ROW in the Project area and discuss the mitigation measures that may be necessary

to avoid potential corrosion issues resulting from induced current. Preliminary cost estimates for this mitigation have been incorporated in the cost estimates presented in Section 2.1.7 above.

2.4.1.3 Interstate or State Highways

None of the Route Alternatives would parallel state or interstate highway ROW. All routes cross State Highway 27/70 at existing crossing locations. In addition; Alternate Route A crosses State Highway 70 at one new location (Segment 40), as does Alternate Route B (Segment 62). Xcel Energy will coordinate with Wisconsin Department of Transportation (WisDOT) to update existing or obtain new utility crossing permits as necessary once the final route is selected.

2.4.1.4 Table 1B, Route Segments Building Impacts

2.4.1.4.1 Building Categories

Xcel Energy has determined the number of buildings tallied by building type (residences, apartments, schools, daycare centers, hospitals, and commercial/industrial structures) that come within the following distances of the proposed centerline for each of the three Route Alternatives: 0-25 feet; 26-50 feet; 51-100 feet; 101-150 feet; and 151-300 feet. This information is summarized in Appendix A, Table 1B.

2.4.1.4.1.1 Homes

Table 1B presents the data for residential buildings within each distance specified above for each segment of the three Route Alternatives. The total number of homes within 300 feet of the centerline of each route alternative is as follows:

- **Preferred Route** - 38 homes within 300 feet
- **Alternate Route A** - 37 homes within 300 feet
- **Alternate Route B** - 60 homes within 300 feet

2.4.1.4.1.2 Apartments

No apartment buildings were identified within 300 feet of the centerline of any proposed segment or route. Rental homes and duplexes would be included in the numbers for homes provided in Section 2.4.1.4.1.2 above.

2.4.1.4.1.3 Schools

No schools were identified along any proposed segment or route.

2.4.1.4.1.4 Daycare Centers

A database of licensed daycare centers in Sawyer County available through the Wisconsin Department of Children and Families was used to determine the location and size of daycare centers along the proposed Route Alternatives. No daycare centers were identified within 300 feet of any proposed segment or route.

2.4.1.4.1.5 Hospitals

No hospitals or medical clinics were identified along any proposed segment or route.

2.4.1.4.1.6 Commercial/Industrial

Table 1B presents the data for commercial buildings within the distances specified in Section 2.4.1.4.1.1 above for each segment of the three Route Alternatives. Two commercial buildings are within 100 feet of the centerline of a segment shared by all three build alternatives, at the junction of State Highways 27 and 70 (Segment 9 of the Preferred Route and Alternate Route A; Segment 57 of Alternate Route B). These two commercial properties are already in proximity to the existing 345/69 kV transmission line, and none of the route options involve any new structures in this location. The centerline of Segment 17 (common to all three routes) is within 50 feet of a building associated with a commercial racetrack. The rebuild along this segment would be within existing transmission ROW and would not affect the current use of that property.

One commercial building is within 100 feet of the centerline of Segment 7 of the Preferred Route, at the intersection of State Highway 27 and Boylan Road. This segment would be along new ROW.

2.4.1.5 Changes to Existing Easements (2.4.1.5.1- dates when existing easement were reviewed for project; 2.4.1.5.2 reasons why easements are to be renegotiated/rewritten)

Xcel Energy has reviewed the existing easements in the Project area. It is anticipated that most existing easements along rebuild routes may need to be renegotiated and/or rewritten to accommodate the change from 69 kV to 161 kV or 161/69 kV and HVTL statutory requirements.

2.4.2 Table 2 Impacts by Land Type

Appendix A, Table 2 provides total length and area of the proposed easement width for each segment that passes through the following resource areas: Crop Land, Pasture, Old Field, Specialty, Ginseng, Tree Farm, Orchard, Cranberry Bog, Prairie/Grassland, Upland Forest, Forested Wetland, and Non-forested Wetland. The table also lists impacts on Developed Lands (Residential and Commercial).

For segments along county or town roads, the area of impact calculated to estimate the impacts to private property owners assumes the transmission line centerline is placed approximately 15 feet (for 161 kV and 161/69 kV structures) or 5 feet (for 69 kV and 69/69 kV structures) on private property. This results in a 65-foot wide easement on private property for 161 kV and 161/69 kV structures, and a 30-foot wide easement for 69 kV and 69/69 kV structures..

2.4.3 Table 3 Impacts by Land Ownership**2.4.3.1 Table 3**

Table 3 in Appendix A presents the data for state lands within the distances specified in Section 2.4.1.4.1.1 above from the centerlines of the Preferred Route and Alternate Routes A and B (Sections 2.4.3.1.1 – 2.4.3.1.4).

2.4.3.1.5 Public and Tribal Lands

2.4.3.1.5.1 Federal Land (parks, trails, scenic riverways, wildlife/fish refuges, other)

Aside from BIA trust land within the LCO Reservation (discussed below in Tribal Lands), there are no federal lands located along any of the routes.

2.4.3.1.5.2 State Properties (wildlife areas; fisheries; state forest; state natural area; park; trail/bike path; other)

As noted below, Segment 17 (common to all three routes) crosses the state-managed Tuscobia State Trail at one location. This rebuild segment would not require new ROW across the trail, which is used for biking, hiking, and snowmobiling. Additional crossings of state lands by the Route Alternatives are as follows:

Preferred Route

- Segment 14A crosses the Flambeau River State Forest for 2,827 feet, and Segment 17 crosses the Tuscobia State Trail for 163 feet. Both of these are rebuild segments that would not require additional ROW.
- Segment 12 crosses the Sand Lake Rearing Station for 1,101 feet. This segment would require 35 feet of additional ROW to install the new 69 kV structures.

Alternate Route A

- Segment 28 crosses the Sand Lake Rearing Station for 1,101 feet, Segment 30 crosses the Flambeau River State Forest for 2,827 feet, and Segment 17 crosses the Tuscobia State Trail for 163 feet. These are rebuild segments that would not require additional ROW.
- Segment 43 crosses the southwestern edge of the Rem-Hauer Creek Fishery Management Area for 1,628 feet along new ROW.

Alternate Route B

- Segment 60 crosses the Sand Lake Rearing Station for 1,101 feet and Segment 17 crosses the Tuscobia State Trail for 163 feet. These are rebuild segments that would not require additional ROW.
- Segment 62 crosses the Sand Lake Rearing Station for 823 feet along new ROW.
- Segment 63 crosses the eastern edge of the Rem-Hauer Creek Fishery Management Area for 2,681 feet along new ROW.

2.4.3.1.5.3 County-Owned Land (park; county forest; trail/bike path; office/garage; other)

Although there are several tracts of County-managed forest land in the Project area, none of the Route Alternatives cross county-managed or -owned land.

2.4.3.1.5.4 Village, City or Town (park; school; forest; office/garage; other)

The Project would cross unincorporated land within the townships of Bass Lake, Edgewater, Radisson, Sand Lake, and Couderay.

Segment 40 (Alternate Route A) passes along the eastern edge of the Village of Stone Lake. No other segment is along a village, city, or town.

2.4.3.1.5.5 Tribal Lands

Segments 14A, 14B, 15A, 15B, 16A and 16C of the Preferred Route, and Segments 30, 15A, 15C, 16B and 16C of Alternate Route A, cross the LCO Reservation. These rebuild route segments would maintain the current widths of the existing 69 kV line ROW within the LCO Reservation. Xcel Energy entered into an agreement with the LCO Tribe in December 2010 to maintain or upgrade the existing 69 kV line within the existing transmission ROW along these segments.

Alternate Route B has no segments on tribal lands in the LCO Reservation; the proposed tap line to the Edgewater Pumping Station (Segment 46) is on privately-owned land. This is a common segment with Alternate Route A.

2.4.4 Table 4 Route Impact Summaries

Appendix A, Table 4 summarizes the impacts of the routes on Land Cover and Residential areas.

2.4.5 Agricultural Land

Table 4 in Appendix A provides the acreage and type of current agricultural land uses along new ROW segments for all three Route Alternatives. The segments that cross agricultural land and that would require new ROW potentially affecting agricultural uses are:

- **Preferred Route** - Segments 3, 4, 5, 6, 7, 8, 9, 10, 17, 18A, 18B, and 72
- **Alternate Route A** - Segments 9, 17, 18A, 18B, 22, 23, 24, 24A, 24B, 25, 26, 27, 35, 37, 40, 41, 44, and 72
- **Alternate Route B** - Segments 3, 17, 18A, 18B, 50, 51, 52, 53, 54, 56, 57, 58, 61, 62, 63, 64, 68, 69, 70, and 72

2.4.5.1 Type of Farming

Corn and soybean production are the main crops grown in the Project area. Pasture land is also crossed by several of the segments, as shown in Appendix A, Table 4.

2.4.5.2 Practices Potentially Affected

The current crop production in the new ROW segments would be affected in the areas directly around the structure locations. To the extent feasible, Xcel Energy has worked to place new structures along field lines to minimize these impacts. In areas where proposed structures are adjacent to the existing 345/69 kV structures in crop areas, Xcel Energy has placed the new transmission line as close as possible to the existing transmission line to reduce impacts.

No impacts to pasture practices would occur from the placement of the line; landowners can continue to use the lands for grazing purposes.

2.4.5.3 Affected Parcels in Farmland Preservation Programs

There are no known designated farmland preservation program parcels on any of the route alternative segments.

2.4.5.4 Proximity to Farm Buildings

Table 1B in Appendix A presents the data for farm buildings located within the distances identified in Section 2.4.1.4.1.1 along each segment of the three Route Alternatives, which is summarized below:

- **Preferred Route** - 1 farm building within 100 feet;
- **Alternate Route A** - 2 farm buildings within 100 feet; and
- **Alternate Route B** - 1 farm building within 100 feet.

2.4.6 Forest

Table 2 in Appendix A provides the number of acres of new ROW along upland forest for the new ROW route segments, which is summarized below:

- **Preferred Route** - 14 acres;
- **Alternate Route A** - 28 acres; and
- **Alternate Route B** - 96 acres

2.4.6.1 Land enrolled under Managed Forest Law (MFL) and

2.4.6.2 Land enrolled under Forest Crop Law (FCL)

Based on a general evaluation, it is likely the routes pass through land enrolled in the Managed Forest Law (MFL) and Forest Crop Law (FCL) programs. Both the FCL and MFL programs allow for up to 20 percent of the area enrolled to be converted to “non-productive” forest land. This allows for potential easement clearing. If a current landowner has expended this 20 percent “non-productive” forest land allowance and additional clearing is proposed, it may result in the parcel being withdrawn from the program. Xcel Energy would evaluate the impact of the Project on lands enrolled in these programs based on the route alternative selected by the PSCW.

2.4.7 Conservation Easements

Review of current land cover and discussions with landowners indicate that there may be parcels along the routes that are enrolled in conservation easements, such as the Conservation Reserve Program. The U.S. Department of Agriculture (USDA) manages these programs, and Xcel Energy will coordinate with the USDA once a route is selected to determine if any affected parcels are enrolled in conservation easements. However, placement of a transmission line should not affect the use or purpose of a conservation easement.

2.4.8 Endangered, Threatened, or Special Concern Species and Natural Communities

The WDNR Natural Heritage Inventory (NHI) database indicates that there are records of several state-listed species and federally-protected species within two miles of the Route Alternatives, as shown in Table 2.4-1 below.

**Table 2.4-1: NHI Recorded State or Federal Listed Species within
Two Miles of Transmission Line Routes**

Scientific Name	Common Name	Taxa	State Status	Habitat
<i>Haliaeetus leucocephalus</i>	bald eagle	bird	SC/P	Large trees in isolated areas in proximity to large areas of surface water, large complexes of deciduous forest, coniferous forest, wetland, and shrub communities. Large lakes and rivers with nearby tall pine trees are preferred for nesting.
<i>Canis lupus</i>	gray wolf	mammal	SC/FL	Gray wolves' habitat preferences appear to be more prey dependent than cover dependent. Forests, open meadows, rocky ridges, and lakes or rivers all comprise a pack's territory.
<i>Potamogeton pulcher</i>	spotted pondweed	plant	END	Shallow water and muddy shores and emergent marshes.
<i>Lepomis megalotis</i>	longear sunfish	fish	THR	Clear, shallow, moderately warm, still waters of streams and occasionally in lakes.
<i>Moxostoma valenciennesi</i>	greater redhorse	fish	THR	Clear water of medium to large rivers, over bottoms of sand, gravel, or boulders.
<i>Cyclonaias tuberculata</i>	purple wartyback mussel	mussel	END	Large rivers in the western and southern parts of the state. It prefers a stable substrate containing rock, gravel, and sand in swift current.
<i>Emydoidea blandingii</i>	Blanding's turtle	reptile	THR	Wide variety of aquatic habitats including deep and shallow marshes, shallow bays of lakes and impoundments where areas of dense emergent and submergent vegetation exists, sluggish streams, oxbows and other backwaters of rivers, drainage ditches (usually where wetlands have been drained), and sedge meadows and wet meadows adjacent to these habitats.
<i>Glyptemys insculpta</i>	wood turtle	reptile	THR	Clean rivers and streams with moderate to fast flows and adjacent riparian wetlands and upland deciduous forests. This species often forages in open wet meadows or in shrub-carr habitats dominated by speckled alder. This semi-terrestrial species tends to stay within about 300 meters of rivers and streams. This species nests in sand or gravel, usually very close to the water, although it is known to nest along sand and gravel roads or in abandoned gravel pits some distance from water.

State Status Key:

END - Endangered

THR - Threatened

SC/P - Special Concern, fully protected

SC/FL = federally protected as Endangered or Threatened, but not so designated by WDNR

On November 2nd and 3rd, 2010, Cedarburg Science, LLC (Cedarburg) conducted a natural resource assessment reconnaissance visit of the overall Project area. This included a general assessment of potential habitat for sensitive species in the vicinity of the Route Alternatives. Cedarburg's evaluation included assessment of potential habitat for the species listed above, as well as state special concern species that have been documented within two miles of the transmission routes, including: climbing fumitory (*Adlumia fungosa*), Robbin's spikerush (*Eleocharis robbinsii*), least darter (*Etheostoma microperca*), Torrey's bulrush (*Scirpus torreyi*), purple bladderwort (*Utricularia purpurea*), lake sturgeon (*Acipenser fulvescens*), elktoe mussel (*Alasmidonta marginata*), round pigtoe mussel (*Pleurobema sintoxia*), woodland jumping mouse (*Napaeozapus insignis*), weed shiner (*Notropis texanus*), American bullfrog (*Rana catesbeianus*), Vasey's pondweed (*Potamogeton vaseyi*) and osprey (*Pandion haliaetus*). Cedarburg did not conduct a field survey of the entire existing or proposed transmission ROW, nor conduct any species-specific surveys. Necessary surveys will be conducted after a route has been selected by the PSCW. The results of this evaluation along with a copy of this joint application will be submitted to the WDNR Office of Energy for its review and comment. In addition, a confidential copy of this evaluation is filed with the Commission in this Docket as redacted Appendix B-10.

The measures described in Section 2.4.14, below, to reduce and mitigate impacts to wetlands and surface waters, would also reduce the potential impacts to special status plant, turtle, amphibian, and mussel and fish species. The following specific measures would be taken to reduce potential impacts to special status species:

- Turtles - If construction cannot be avoided in known habitat during the turtles' active season (March through October), the installation of turtle exclusion fencing and removal of turtles prior to any construction activity in these limited areas would reduce the potential for impact to turtles. Outside of the active season, construction impacts would be minimized by limiting excavation activities and heavy equipment usage in wetlands.
- Bald Eagle - If any active nests are identified within the Project area during construction, Xcel Energy would work with the US Fish and Wildlife Service (USFWS) and WDNR to avoid impacts. To minimize disturbance, Xcel Energy would not conduct construction activities closer than 660 feet to any active nesting sites during nesting period (February through August). For any nest identified in the vicinity of any new ROW routes, measures will be taken to maintain existing forested or natural areas between the construction activity and the nest to the greatest extent feasible. Xcel Energy avoids construction during active nesting.

2.4.9 Archaeological and Historic Resources

Data from the Wisconsin Historical Society – Division of Historical Preservation was obtained and reviewed. This review included records of archeological, architectural, and historical sites located within one-half mile of the proposed Route Alternatives and substation sites. Specifics of cultural resource sites and locations are shown in Appendix B-11. In addition, the results of this evaluation along with a copy of this joint application will be submitted to the Wisconsin

Historical Society. Two documented archaeological sites – Sites SY-0190 and SY-0191 – are both within 100 feet of Segment 12 (Preferred Route), Segment 28 (Alternate Route A), and Segment 60 (Alternate Route B).

Once the final route is selected, Xcel Energy will continue the review of archaeological resources during final design of the line. If poles cannot span the documented archaeological sites, a Phase I survey would be conducted to confirm the location and determine if evidence of the site remains. Xcel Energy would then consult with the Wisconsin Historical Society on any required mitigation measures.

In addition to the Wisconsin Historical Society, Xcel Energy is coordinating with the LCO Tribal Historic Preservation Office (THPO) to identify archeological, cultural, historic, or religious properties or resources within the borders of the LCO Reservation and the existing 69 kV line ROW. On May 6, 2011, Xcel Energy staff accompanied Jerry Smith, the Tribal Historic Preservation Officer for the LCO Tribe, on a field review of the transmission ROW within the LCO Reservation. The team walked over areas identified by Mr. Smith as having the potential to contain archaeological or cultural resources. No cultural resources were identified during this field review.

Xcel Energy will work with the LCO THPO to develop a plan should previously unknown archaeological resources or human remains be encountered during construction. This plan will outline the framework for handling such discoveries in an efficient and legally compliant manner. Crews will be trained for identification of possible resources in advance of construction. In the event resources or remains are discovered, work will be stopped to avoid disturbance of the discovery and Mr. Smith will be immediately contacted along with the appropriate authorities under local and state law, as applicable. Cultural resources monitors will be in attendance during structure foundation excavation on the LCO Reservation and other locations off the LCO Reservation as identified by the LCO THPO.

2.4.10 Nearby Airports

The WisDOT Bureau of Aeronautics was contacted by letter dated June 14, 2010, requesting its review and comment on the proposed Project. The preferred and alternate routes are located approximately 9.2 statute miles south of the Sawyer County Airport in Hayward, and approximately 13.8 statute miles northeast of the Nest of Eagles Airport in Spooner. The Bureau reviewed the June 14 letter and other information provided by Xcel Energy, and by letter dated June 21, 2010, issued a finding that the proposed Project would have no aeronautical effect on the Hayward and Spooner airports and therefore it has no objection to the Project. A copy of the June 21 Bureau letter is in Appendix F-1.

2.4.11 Access Issues

Proposed access points to new ROW in the Route Alternatives are shown in the detailed figures in Appendix B-3. The proposed access to new ROW segments is summarized below.

Preferred Route – In general, access to the Preferred Route will be along existing transmission ROW, which accounts for 90% of the length this alternative. For the segments of new ROW, access is proposed as follows:

- Segment 7 – access would be from Boylan Road and the Sand Lake Substation, primarily following the proposed transmission ROW
- Segment 8 – access would be from Old Highway 27 to the west, and from the existing transmission ROW to the south, primarily following the proposed transmission ROW
- Segments 18 A – 18 D – Access would be from Polish Road to the north, and from the existing transmission ROW to the east

Additionally, due to wetland and stream crossings and steep terrain in some areas along the rebuild sections of the Preferred Route, additional access outside of the existing ROW is proposed, as shown in the detailed figures in Appendix B-3, and described below.

- Segment 14A – access to this segment of the rebuild route would be obtained through the use of two existing roads as well as the existing ROW, from west to east as follows: an existing gravel road off of County Road F, and an existing gravel road off of State Highway 27/70
- Segment 16C – in addition to the existing ROW, access to this segment would be obtained through the use of three existing roads, from west to east as follows: an existing gravel road off of Right of Way Road to access structures west of the Couderay River; an existing gravel road off of State Highway 27/70 to access structures between Surette Creek and Devil's Creek; and an existing gravel road off of Smith Road to access structures west of a steep grade along the existing ROW
- Segment 17 - in addition to the existing ROW, access to this segment would be obtained through the use of several existing access points, from west to east as follows: three existing field roads from Chafer Road to access structures between the Couderay River and Tuscobia State Trail; gravel trails off of Hofer Road and Delap Lane to access structures between two wetland complexes, and an existing gravel road off of Old Couderay Road

Alternate Route A – approximately 36% of the length of this route is along new (non-transmission) ROW. For these segments of new ROW, access is proposed as follows:

- Segment 35 – access would be from the Stone Lake Substation at the north end, and from McLeod Road from the south, primarily following the proposed transmission ROW
- Segment 36 – access would be from McLeod Road and N. Boylan Road, primarily following the proposed transmission ROW
- Segment 37 – access would be from N. Boylan Road on the west and existing transmission ROW on the east, primarily following the proposed transmission ROW

- Segment 40 – access would be from N. Boylan Road on the east, W. Boylan Road and State Highway 70 in the middle, and County Road F on the south. Access would primarily follow the proposed transmission ROW, avoiding tree rows and following field lines as much as possible
- Segment 41 – access would be from County Road F, Dump Lane, and Pank Road. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings
- Segment 42 – access would be from Railroad Lane, primarily following the proposed transmission ROW
- Segment 43 – access would be from Railroad Lane from the west, and from County Road F from the east, and primarily follow the proposed transmission ROW adjacent to the railroad
- Segment 44 – access would be from Strand Road. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings
- Segments 45 and 46 – access would be from Strand Road to the north and the Edgewater Pumping Station to the east, and primarily follow the proposed transmission ROW

The same access points to the portions of the route through the LCO Reservation and Segments 17, 18 A, 18B, 18C, and 18 D of the Preferred Route described above would also be used for Alternate Route A.

Alternate Route B – approximately 44 % of the length of this route is along new (non-transmission) ROW. For these segments of new ROW, access is proposed as follows:

- Segment 52 – access would be from existing transmission ROW to the west and State Highway 27 to the east. Access would avoid crossing the wetland areas on either side of State Highway 27 to the greatest extent possible
- Segments 53 and 54 – access would be from Old Highway 27 on the north and the existing transmission ROW on the south, primarily following the proposed transmission ROW
- Segment 62 – access would be from County Roads E and F. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings
- Segment 63 – access would be from County Road F. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings

- Segment 64 - access would be from Strand Road. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings
- Segments 46, 65 and 66 – access would be from Strand Road to the north and the Edgewater Pumping Station to the east, and primarily follow the proposed transmission ROW
- Segment 66 – access would be from Hauer Road from the north, Right of Way Road and Short Cut Road in the middle sections, and Summit Lake Road from the south; access would primarily follow the proposed transmission ROW, avoiding wetland crossings to the extent possible.
- Segment 67 – access would be from Summit Lake Road on the west, and primarily follow the proposed transmission ROW
- Segment 68 – access for the western five structures would be along Segment 67 (with access from Summit Lake Road) and from W. Ortig Lane and County Road C for the remainder of the segment. For upland areas, access would follow the proposed transmission ROW; for structures in wetlands, access would be from the adjacent roadway to minimize the length of wetland crossings
- Segment 69 – access would be from two existing field roads coming off of County Road C for the majority of the length, and from County Road C at the northern end.
- Segment 70 – access would be from County Road C and primarily follow the proposed transmission ROW with the exception of the wetland and Couderay River areas. For poles on either side of these features, access would be directly from County Road C to avoid access crossings.

The same access points to Segments 17, 18 A, 18B, 18C, and 18 D of the Preferred Route as described above would also be used for Alternate Route B.

2.4.12 Waterway Permitting Activities

Each route alternative crosses permanent waterways, as shown in the detailed figures in Appendix B-3, which are summarized below:

Preferred Route

- Segment 12 – Sand Creek, Unnamed Tributary to Sand Lake;
- Segment 16C – Couderay River, Surette Creek, Devil's Creek; and
- Segment 17 – Couderay River, Section 10 Creek.

Alternate Route A

- Segment 28 – Sand Creek, Unnamed Tributary to Sand Lake;
- Segment 16C – Couderay River, Surette Creek, Devil's Creek;
- Segment 17 – Couderay River, Section 10 Creek;
- Segment 41 – Sissabagama Creek; and

- Segment 44 – Hauer Creek.

Alternate Route B

- Segment 17 – Couderay River, Section 10 Creek;
- Segment 60 – Sand Creek, Unnamed Tributary to Sand Lake;
- Segment 62 – Sand Creek, Unnamed Tributary to Sand Lake;
- Segment 63 – Hauer Creek;
- Segment 64 – Hauer Creek;
- Segment 66 – Hauer Creek, Summit Creek, Summit Lake;
- Segment 68 – Alder Creek and Swift Creek; and
- Segment 70 – Couderay River.

The transmission line route will span all waterways, and there will be no disturbance of stream banks or lake beds. It is anticipated that the limited number of construction access crossings listed above will occur either during the winter, or during dry periods at locations where the waterways have no defined channels within the associated wetlands and can therefore be crossed with matting to avoid disturbance. As a result, no WDNR waterway crossing permit is being sought. However, as noted above, Alternate Route B would span the eastern shore of Summit Lake, and it is possible that the transmission line conductor would span over the Ordinary High Water Level for the lake due to constraints imposed by the natural gas pipeline and the 345 kV transmission line in the area. If this route is selected, Xcel Energy would work with the WDNR to determine if a water crossing permit is required for the conductor spanning this lake.

2.4.13 Wetlands and Wetland Crossings

Each route alternative crosses wetlands, as shown in the detailed figures in Appendix B-3. Pole locations have been developed to evaluate potential impacts to wetlands and develop preliminary access routes. The wetland impacts and access routes would be re-evaluated during the design phase to minimize impacts to the extent practicable without adding undue costs and physical impacts to the integrity and reliability of the transmission line design, and to accommodate landowner concerns. There is potential for the estimated wetland impacts to be adjusted if unknown conditions are encountered prior to or during detailed design. These conditions could include impacts on span lengths due to the physical terrain of the land and refinement of wetland boundaries.

Due to the extent of wetlands in the Project area, all three routes involve construction access routes where temporary wetland crossings will be necessary. Temporary impacts will be avoided and minimized by either constructing during frozen ground conditions or through the use of construction mats. As stated above, no streams or lakes will be crossed by construction equipment, and no temporary bridges will be necessary. Estimated areas of temporary wetland crossings are summarized below; these are worse case estimates, assuming temporary impact widths of up to 16 feet for the length of any crossing (actual impacts would be less since many of the access routes are existing gravel or dirt trails and will need few upgrades).

Preferred Route –

- Approximately 39 poles placed in wetlands, 74 existing poles removed, for a net permanent impact of approximately 758 square feet
- Approximately 66,160 square feet (1.52 acres) of wooded wetland crossings that would result in permanent changes to wetland type
- Approximately 396,208 square feet (9.1 acres) of temporary construction access impacts

Alternate Route A

- Approximately 103 poles placed in wetlands, 74 existing poles removed, for a net permanent impact of approximately 1,534 square feet
- Approximately 858,050 square feet (19.6 acres) of wooded wetland crossings that would result in permanent changes to wetland type
- Approximately 531,440 square feet (12.2 acres) of temporary construction access impacts

Alternate Route B

- Approximately 38 poles placed in wetlands, 78 existing poles removed, for a net permanent impact of approximately 1,048 square feet
- Approximately 945,000 square feet (21.7 acres) of wooded wetland crossings that would result in permanent changes to wetland type. It is possible that some of the wetlands along the existing corridor through the LCO Reservation would also change type over time once the transmission line is removed; those changes have not been included
- Approximately 439,168 square feet (10.1 acres) of temporary construction access impacts, including temporary impacts to wetlands due to the activities associated with removing the existing 69 kV line through the LCO Reservation

More detailed information on each wetland within the proposed transmission ROW is summarized in Appendix G. The tables are organized by route and the information within them is organized by route segment and wetland ID.

2.4.13.1 Wetland Delineation

Wetlands along the Preferred and Alternative Routes have not yet been delineated. After the final route is selected and prior to construction, wetland delineation will be conducted to identify potential wetland areas that cannot be spanned. Wetland delineation will be conducted in the field following the methods set forth in the 1987 “Corps of Engineers Wetland Delineation Manual” and relevant guidance documents. The Wetland Delineation Report will be provided under separate cover. The preferred and alternate sites for the Radisson Substation have been delineated for substation layout analysis purposes; the delineation report was included in the WDNR Permit Application Part 1 (Appendix G).

2.4.13.2 Remotely Identified Wetlands

Potential wetlands were remotely identified along the proposed Route Alternatives. The wetland boundaries were not delineated in the field, but were conservatively estimated using field

observations (conducted June 2010, August 2010, November 2010 and July 2011) and through interpretation of existing mapping (soil survey information, aerial photographs, Wisconsin WWI and topographic maps). These refined, field identified wetlands are presented in the detailed figures in Appendix B-3.

2.4.13.3 Wetland Crossing Details

Detailed information on each wetland crossing location is provided in Appendix B-3.

2.4.13.4 Sensitive Wetlands and Areas of Special Natural Resource Interest

Wisconsin Administration Code § NR 103.04 affords special consideration to wetlands in Areas of Special Natural Resource Interest (ASNRI). This designation includes those wetlands both within the boundary of designated ASNRI and those wetlands that are in proximity to, or have a direct hydrologic connection to, such designated areas.

Wetlands associated with the Couderay River, Hauer Creek, Alder Creek, and Devil's Creek would be considered ASNRI wetlands as they are adjacent to and have a hydrological connection to these special status streams.

2.4.14 Mapping Wetland and Waterway Crossings

The detailed figures in Appendix B-3 show WWI wetlands and waterways, as well as the desktop analysis and field identification of refined wetland boundaries on a 2010 aerial base. No temporary stream crossings are necessary for the Project. Structure locations and access routes along the three proposed Route Alternatives are shown on all detailed aerial based maps in Appendix B-3.

2.5 CONSTRUCTION METHODS

2.5.1 General Construction Information

Construction will begin after federal, state and local approvals are obtained, the necessary property and ROW are acquired, soil conditions are established, and the final Project design is completed. The timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues, and available workforce.

The actual construction will follow standard construction and mitigation "best management practices" (BMPs) that have been developed from experience with past projects. These BMPs address ROW clearance, construction staging, erecting the transmission line structures, and stringing the transmission conductors. The application of BMPs to minimize impacts will also take into consideration the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain, and other relevant factors.

The following describes Xcel Energy's BMPs for overhead transmission line construction. See Section 2.6.7, below, for discussion of substation construction BMPs.

2.5.1.1 Type and Location of Structures

The Project's proposed transmission lines are a single circuit 69 kV line (all Route Alternatives), a single circuit 161 kV line (Alternate Routes A and B), a double circuit 161/69 kV line (all route

options), and a small segment of 69/69 kV double circuit structures proposed for Alternate Route A. See Section 2.1.2 above for descriptions of the proposed structure types and span lengths to be used for various segments of the transmission line.

2.5.1.2 Existing Structures

All existing 69 kV H-frame wooden structures within the rebuild segments of the proposed Route Alternatives will be removed except for the 69 kV tap line to the Edgewater Pumping Station. For the Preferred Route and Alternate Route A (Segments 15A and 15B, respectively), only the northernmost existing structure of the tap line would be removed and replaced.

For all routes, the existing H-frame structures from the end of Segment 17 south to the Couderay Substation would also be removed. For Alternate Route B, all existing structures within the LCO Reservation would be removed, including the existing tap line to the Edgewater Pumping Station.

For all segments involving upgrading the existing 69 kV circuit on the 345/69 kV line co-owned by ATC and Xcel Energy, no changes to the existing structures are proposed.

2.5.1.3 Structure Placement

The majority of the 161 kV and 161/69 kV structures are expected to be installed on concrete foundations. The steel structures will be installed on drilled pier concrete foundations if soil conditions permit. In poor soil conditions, driven or vibrated steel pile foundations may be required.

The 69 kV single circuit and 69/69 kV double circuit structures are expected to be direct embedded. In areas with poor soil conditions, the structures will be direct embedded in steel culverts backfilled with crushed rock. To avoid the need for guying, all 69/69 kV dead-end structures will be steel structures on engineered foundations.

2.5.1.4 Concrete Foundation Type (size and depth)

Foundations for steel pole structures (for 161 kV, 161/69 kV and 69/69 kV dead-end) would require excavating or auguring a hole approximately 20 to 40 feet deep and approximately 5 to 8 feet in diameter.

For the 69 kV and 69/69 kV structures requiring steel culverts, the culvert dimensions would depend upon soil conditions, with an expected depth from approximately 8 to 14 feet, and approximate diameter of 3 to 4 feet.

After the foundation hole is excavated, it is filled with concrete from a local concrete batch plant. The completed foundation is allowed to cure to develop the necessary strength. The pole would then be lifted, placed, and secured on the foundation by a crane or similar heavy-duty equipment. Excess soil would be removed from the site unless otherwise requested by the landowner or land manager. Gravel pits or construction sites are examples of nearby property that may accept fill.

In wet soil conditions, limited dewatering may be necessary during excavation. Water will be stored and discharged in accordance with applicable Wisconsin and federal regulations.

2.5.1.5 Types of Machinery

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

2.5.1.6 Width of Construction Zone

Construction-related disturbance will generally be confined to the transmission ROW and access routes to the Project sites. Xcel Energy will utilize existing roads and transmission ROW, and arranged access locations where roadways are not present. Most disturbances will likely occur in the areas immediately surrounding transmission line structures. In areas where access cannot be gained from existing roads, some disturbance along access paths may also occur. Typically, an access path approximately 16 feet wide would be needed in these cases. Disturbances at these areas may include clearing of vegetative cover, soil compaction, vehicular traffic, and some topsoil disturbance. Permission from the land owners or managers is obtained prior to establishing a path to access the transmission line route. Maps showing existing and proposed access routes are provided in the Environmental Features maps (Appendix B-3).

Once foundations and poles are in place, conductors on the new structures would be installed by establishing stringing setup areas within the transmission ROW, typically every two miles, which would store the spools of conductor cable. Crews would drive along the ROW securing the conductor line through the insulators on the poles and installing shield wire clamps once final sag is established. The structures would be accessed by a bucket truck or similar vehicle with a hydraulic system. Where the transmission line crosses streets, roads, highways, energized conductors, or other obstructions, temporary guard or clearance poles may be installed. This ensures that conductors do not obstruct traffic or contact existing energized conductors or other cables during stringing operations, while also protecting the conductors from damage. Line workers are present during the wire installation over roadways to monitor traffic and complications that might occur. Once installation of new conductors has been completed, the temporary guard poles would be removed.

2.5.1.7 Staging Areas

Transmission projects of the type Xcel Energy is proposing here usually require the use of staging areas. Staging refers to the delivery of the equipment and materials necessary to construct the transmission line or substation facilities. Construction of the Project would likely include a number of staging areas, where construction materials would be stored until they are needed for the Project.

The staging areas would be selected for their location, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize vegetation clearing, excavation, and

grading. Site maps showing planned staging areas are shown in the Environmental Features maps (Appendix B-3). Each staging area is anticipated to be between 5 and 20 acres. The locations of the planned staging areas for the Project are:

- S $\frac{1}{2}$ SE $\frac{1}{4}$ Section 5, T39 R9
- SE $\frac{1}{4}$ SW $\frac{1}{4}$ and SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 3, T38 R8
- SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 10, T38 R8
- NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 27, T39 R9

The affected landowners for all four of these sites have signed rental option agreements with Xcel Energy. If it is determined that additional staging areas may be necessary for construction of the Project, Xcel Energy would work with the affected landowners of potential additional sites to obtain rental agreements.

2.5.1.8 Construction Methods

The proposed 161/69 kV transmission line would be constructed at-grade for the majority of the transmission ROW. In some isolated cases, grading could be required at structure locations if there is sloping or uneven ground to provide a level access route or working area. During construction, crews would limit ground disturbance, including avoiding driving over wet soils as feasible. Construction mats may be placed in wet or soft soil locations and in narrow ditches to minimize disturbance. These mats can also provide access to sensitive areas during times when the ground is not frozen, minimizing impacts at the site. Temporary disturbance areas would be restored to their original condition to the extent practical. Reclamation activities would include removing and disposing of debris, dismantling all temporary facilities, leveling or filling tire ruts, and controlling erosion. Additionally, if any tree clearing was necessary in isolated areas, Xcel Energy would coordinate with affected landowners and land managers to determine the appropriate re-vegetation strategy.

2.5.1.8.1 Agricultural Lands

Agricultural areas are found along Segments 3, 4, 5, 6, 7, 8, 9, 10, 17, 118A, 18B, and 72 of the Preferred Route; Segments 9, 17, 18A, 18B, 22, 23, 24, 24A, 24B, 25, 26, 27, 35, 37, 40, 41, 44, and 72 of Alternate Route A; and Segments 3, 17, 18A, 18B, 50, 51, 52, 53, 54, 56, 57, 58, 61, 62, 63, 64, 68, 69, 70, and 72 of Alternate Route B. In agricultural areas (lands under cultivation, lands used for hay production, and lands used for pasture) BMPs would be followed to minimize damage to existing crops and vegetation, as well as minimizing soil erosion. Xcel Energy will strive to use access routes that minimize impacts to agricultural land to the extent practicable (e.g., utilizing field edges or existing transmission ROW). Landowners will be compensated for crop and other damages arising from construction activity, consistent with the terms of the Project's easement.

2.5.1.8.2 Forestlands

Forested areas are found along sections that will require either new ROW or additional width of existing ROW: Segments 1A, 2, 4, 7, 8, 10, 11, 12, 13, 18B, 18C, and 18D of the Preferred

Route; Segments 1A, 18B, 18C, 18D, 20, 21, 23, 24, 35, 36, 37, 40, 41, 43, 44, 45, and 46 of Alternate Route A; and Segments 18B, 18C, 18D, 46, 50, 52, 54, 55, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 73B, and 74 of Alternate Route B. All tall-growing vegetation and brush within the transmission ROW will be cleared to facilitate the safe and efficient construction, operation, and maintenance of the transmission line. Vegetation will be cut at or slightly above the ground surface. Root stocks will be left in place to regenerate after construction, except in areas where stump removal is necessary to facilitate the movement of construction vehicles along the ROW. Re-growth of tall-growing species under the transmission line will not be allowed. The disposition of trees of commercial or other value will be negotiated with the landowner prior to the commencement of land clearing and included in the easement agreement.

2.5.1.8.3 Surface Waters and Wetlands

Project construction will require crossing several perennial and intermittent creeks, streams, and the Couderay River. Depending on which route is selected, some transmission line structures may be placed in mapped floodplains.

Wetlands will be spanned when practicable. Depending on the route selected, construction of the Project may involve wetland impacts such as temporary habitat disturbance associated with construction activities, poles placed in wetlands, and the permanent modification of habitat from forested to non-forested wetlands as a result of clearing the transmission ROW. In instances where spanning is not feasible, Xcel Energy will attempt to schedule construction during frozen ground conditions and select access with the least amount of physical impact to the affected wetland. As much as possible, structures would be placed at the edges of wetlands in order to minimize disturbance.

Additional indirect impacts to surface water and wetlands could include sedimentation reaching surface water during construction. This could temporarily degrade water quality due to turbidity. These impacts would be avoided and minimized using appropriate sediment control practices and BMPs. These practices would be detailed in the Construction Site Erosion Plan, Storm Water Control Plan, and Storm Water Pollution Prevention Plan completed prior to the start of construction.

Practices to minimize and mitigate impacts to surface waters and wetlands may include:

- Spanning all stream banks;
- Containment of stockpiled material away from stream banks;
- Reseeding and revegetating disturbed areas as required by the National Pollutant Discharge Elimination System (NPDES) permit;
- Implementing erosion and sediment controls as required by the NPDES permit;
- Locating structures and disturbed areas 200 feet from streams, where possible;
- Implementing spill prevention, control, and countermeasures procedures for fuel, chemical, and hazardous waste storage containers; and

- Using turbidity control methods for discharge of waste water from concrete batching or other construction operations. Discharged waste waters would be free of settleable material.

For construction near streams, the following measures would be taken:

- A buffer on both banks of a stream crossing would be clearly identified to prevent any construction activity near the banks;
- When construction operations occur over a water body, the operations would be conducted in a manner to prevent materials from falling into the water. If materials did enter the water, they would be removed promptly by hand; and
- The removal of riparian vegetation would be minimized to the extent possible. If vegetation must be removed, disturbed soils would be mulched and reseeded or stabilized promptly following construction to prevent erosion of the stream bank.

For construction in or near wetlands, the following measures would be taken in addition to the erosion and sedimentation controls listed above:

- Assemble structures on upland areas before bringing to the site for installation;
- When construction during winter is not possible, use construction mats where wetlands would be impacted; and
- Remove temporary crossings when they are no longer needed and restore the sites to original grade. Erosion and sedimentation controls would remain in place until the sites are stabilized and re-vegetated.

2.5.2 Underground Construction

No underground transmission line construction is proposed as part of this Project. All proposed transmission lines would be above ground.

2.5.3 Stream/River Crossings

As explained in Section 2.4.12 above, there will be several streams that would be crossed by the Project, including the Couderay River, depending on the final route selected. Construction activities would not impact streambeds or banks of perennial streams. No temporary bridge crossings are proposed for any of the Route Alternatives.

2.5.4 Wetland Crossings

2.5.4.1 Crossing Method

Access through some wetlands would be required during transmission line construction. Methods that may be used to minimize the impact associated with access include, but are not limited to: frozen conditions (i.e. ice roads), low ground pressure equipment, construction mats, temporary access routes, and restricting the length and width of the access path. The locations for access within wetlands are discussed in Section 2.4.13.

2.5.4.1.1 Crossing Structures

Xcel Energy has not identified a specific pole type for crossing wetlands. The proposed typical structures are adequate for effectively minimizing impacts to wetlands. Appendix B-8 contains drawings of the typical pole types proposed for the Project.

2.5.4.1.2 Access Routes in Wetlands

Access to each structure location would be determined based on a combination of factors, including the shortest distance to access the structure and avoid obstacles or sensitive areas such as wetland, forested land, stream crossings, and steep terrain. Where present, previously established access routes would be used. Where no previous access routes are present, new access routes would utilize the transmission ROW corridor or existing roads and trails, where possible, as described in Section 2.4.11 and 2.4.13.

2.5.4.2 Methods of Preventing the Spread of Invasive Species

The cleaning of machinery and control of invasive species will follow the requirements of Wisconsin Administrative Code NR 40. Once a route has been selected by the PSCW, Xcel Energy will conduct an invasive species survey of the ROW prior to construction. In accordance with NR 40, invasive species identified along the Project will be classified as “restrictive” or “prohibited,” as appropriate. Machinery will be cleaned in accordance with the results of the survey and Wisconsin Administrative Code NR 40.

2.5.4.3 Excavated Materials

The estimated area of excavation for poles placed in wetlands would vary by route and foundation type. Depending on foundation type, the area of excavation per pole varies from approximately 10 square feet to 80 square feet.

The volume of excavated material is dependent on the area and depth of the foundations. Material not required for backfilling would be spread in an upland area within the transmission ROW or placed in an appropriate soil disposal location. Section 2.5.7, below, provides more information on estimated excavation volumes in wetlands.

2.5.4.4 Site Dewatering and Fill Materials

The only fill in wetlands for which Xcel Energy seeks authorization would be for pole excavations and backfilling after pole placement. Excavated material would be temporarily stockpiled, either on frozen ground or other appropriate barrier. Fill is not proposed to be placed in wetlands to provide access to construction areas. Dewatering may be necessary at some locations. Refer to Section 2.5.8, below, for further discussion of dewatering methods.

2.5.5 Re-vegetation

The need for and approach to site restoration and re-vegetation would be based on the degree of disturbance caused by construction activities, the ecological setting of each site, and the preferences of the affected landowner or manager. For instance, the property owner of an existing agricultural site may not wish for any re-vegetation, preferring careful replacement of

topsoil. If construction can be accomplished without creating appreciable soil disturbance, restoration may not require re-vegetation efforts.

Restoration activities would be implemented following the completion of construction activities. Restoration would begin as soon as practical and as allowed by weather conditions.

2.5.5.1 Re-vegetation and Site Restoration Plan

The particular ecological setting at any disturbed location will allow Xcel Energy to identify the type of restoration and/or re-vegetation that may be appropriate. For example, if construction results in disturbance of a turf-grass sod area, the type of seed mix used for re-vegetation would be different than if the disturbance occurred in a wet meadow community. Native seed banks, especially resilient species of common grasses and shrubs, may facilitate re-vegetation in disturbed areas. Areas with significant soil compaction and disturbance from construction activities may require assistance in re-establishing the vegetation stratum.

2.5.5.2 Post-construction Monitoring

In cases where there is no sign of re-growth of pre-existing vegetation species in the first month of the subsequent growing season, an appropriate seed mix will be properly applied. Xcel Energy will monitor seeded sites to ensure growth occurs. Once the final route is selected, Xcel Energy will create a Project-specific post-construction monitoring and management plan.

2.5.6 Erosion Control Plan

2.5.6.1 Methods and Materials

The final transmission line route and Radisson Substation site are subject to WDNR requirements for construction site stormwater management and erosion control. In general, the methods and materials to be used for the Construction Erosion Control Plan would include, but are not limited to:

- Containment of stockpiled material away from stream banks;
- Stockpiling and respreading topsoil;
- Reseeding and revegetating disturbed areas as required by the NPDES permit;
- Implementing erosion and sediment controls as required by the NPDES permit; and
- Implementing spill prevention, control, and countermeasures procedures for fuel, chemical, and hazardous waste storage containers.

2.5.6.2 Site Plan

Once the final route is selected and the line is engineered, Xcel Energy will develop a Construction Erosion Control Plan. This plan will specify the BMPs that would be utilized to minimize erosion and sedimentation.

2.5.6.3 Sequence

The sequence of major construction activities for the transmission line and substation, along with minimum construction site erosion control practices includes:

- Surveying and staking of ROW – requires no erosion control measures.
- Development of ROW access – silt fence, vehicle tracking pads, and other applicable erosion control measures would be installed as ROW access is constructed.
- Temporary staging and material storage areas – constructed staging and storage areas that result in ground disturbance would have perimeter sediment controls placed on the downslope side of the site. If access to the staging/storage area is off a permanent road, a vehicle-tracking pad or temporary driveway would be placed at the intersection if field conditions require.
- Clearing of ROW – perimeter sediment control measures would be installed downslope of the cleared areas that result in ground disturbance. Areas that would only be cleared and not sustain further disturbance during construction would be permanently restored, as necessary, if conditions allow. Final restoration in areas of minimal disturbance may not require the application of any measures, or may require erosion control mats, seeding, mulching, or a combination of these.
- Structure site preparation, installation, and wire stringing – perimeter sediment control measures would be installed downslope prior to pole site preparation if conditions warrant.
- Clean up and restoration of ROW – cleanup and site restoration would occur as described in Section 2.5.5 above.

2.5.6.4 Off-site Diversion Methods

Since Xcel Energy does not plan on diverting any water flow, no off-site diversion methods will be necessary.

2.5.6.5 Provisions for Inspection and Maintenance

To comply with applicable regulations during construction activities, Xcel Energy would assign personnel to assist in the development and management of erosion control measures. The personnel would develop erosion control measures and work with the construction crews to ensure they are properly implemented. Monthly reports would be provided outlining measures installed, inspections undertaken, and any issue resolution that occurred. The personnel would also be available to work with the crews to install erosion control measures that may be identified during construction. This could be a result of a variety of issues, such as inspections or unanticipated major weather events.

2.5.7 Materials Management Plan

2.5.7.1 Access Point Locations

Generally, access to existing lines on existing easements or fee-owned ROW will be via existing routes including field entrances, private drive entrances, and direct access for lines that parallel roads. For the areas of the final route that would require ROW acquisition, specified plans for access will be prepared to minimize intrusion on adjacent properties. Section 2.4.11 and the

detailed figures in Appendix B-3 provide more information on the planned access routes for the Route Alternatives requiring new ROW acquisition.

2.5.7.2 Haul Routes

To get to the project area, construction vehicles are expected to utilize public roads, including but not limited to Highways 27/70, and County Roads C, E and F.

2.5.7.3 Stockpile Areas

Inbound materials (poles, hardware, etc) will be stored in staging areas as noted below. Outbound materials (excess spoils pile, concrete washings, etc.) will be hauled off site.

2.5.7.4 Equipment Staging Areas

Construction materials, transmission line poles, wires, equipment, vehicles, removed materials and related materials would be stored on the substation properties, transmission ROW and at temporary staging areas. Potential staging areas have been identified based on the construction requirements of the Project, proximity to work areas, and environmental and landowner impacts. These sites are listed in Section 2.5.1.7 above.

Identified sites have been evaluated for potential environmental impacts. Additionally, they have been selected to minimize the amount of disturbance and preparation required to provide suitable surfaces for temporary storage and staging of construction materials and equipment. The amount of grading and clearing at these sites would be kept to a minimum, as sites are chosen with these considerations in mind.

The four sites selected by Xcel Energy are in agricultural use. Staging areas and associated access would not be located within wetlands. If a selected site is located in proximity or upslope of a wetland or waterway, appropriate erosion control measures would be implemented to prevent impacts.

In general, Xcel Energy plans to use between 5 – 20 acres at each site; a minimum 30-foot wide access path would be required. Upon approval of this Joint Application and final route selection, the actual site and the exact locations of staging areas would be based on several factors, including Project needs and environmental constraints.

Construction materials stored on site generally consist of transmission line poles and wire, equipment used in construction activities, removed materials, and related materials and equipment. Xcel Energy would require all contractors to have a Spill Prevention Control and Countermeasure Plan in place that addresses both the contractor's construction equipment and construction activities.

2.5.7.5 Field Screening Protocol for Contaminant Testing

An environmental contractor with a master services agreement with Xcel Energy would be called into the field if contaminated soil is suspected (based on color, odor, etc.). The contractor would perform initial testing with portable analyzers. If contamination is present, the contractor would excavate all visible traces and store the material until lab test results documented the type

and amount of contamination present. Lastly, the contractor would properly dispose of the material based upon the lab test results.

2.5.7.6 Estimated Types, Concentrations and Volumes of Contaminated Materials

There are no known contaminated materials on existing easements or fee-owned ROW. No soil contaminants are anticipated on the new ROW required for the Route Alternatives being considered.

2.5.7.7 Excavation Methods

The steel pole structures (161 kV, 161/69 kV, 69 kV and the 69 kV and 69/69 kV dead-end structures) will require soil excavation for the concrete foundations. The exact location of the excavation and excavation amounts will depend on the final route selected. Material not required for backfilling, including removed material resulting from both direct-embed structures and those with foundations, would be hauled away to an appropriate soil disposal location, or spread in an upland area within the transmission ROW in isolated instances with landowner permission.

2.5.7.8 Methods for Dewatering of Excavated Materials

Dewatering may be necessary for materials excavated during installation of structures in wetlands. The dewatering methods described in Section 2.5.8, below, would be followed.

2.5.7.9 Estimated Volumes of In-channel and Upland Excavated Materials

No in-channel dredging or bank of waterway area excavation is anticipated. See Table 2.5-1, below, for estimated volumes of wetland and upland excavated materials.

2.5.7.10 Estimated Volumes and Location of Re-used In-Channel and Upland Excavated Materials

Excess excavated earthen materials will not be re-used on site in wetland, developed property, agricultural, or other sensitive areas. Excess excavated materials may be re-used on site in non-urban, non-agricultural use areas in isolated instances with landowner permission by being spread evenly around foundations to promote drainage, in accordance with the Construction Erosion Control Plan that will be developed for the Project. Estimated total volumes of excavated material, including volumes re-used at structure sites and volumes disposed off-site, are shown in Table 2.5-1 below. The estimated volumes per structures are conservative (i.e., the largest numbers in the likely range of foundation dimensions for each structure type are used); it is likely that the actual volume of excavated material will be much lower. For purposes of this analysis, an assumption is made that all excavated materials will be removed and disposed of off-site.

2.5.7.11 Off-site Disposal Plans for Contaminated Materials and Non-contaminated Materials

No contaminated materials are anticipated to be encountered during construction of the Project.

Table 2.5-1. Estimated Volumes of Excavated Wetland and Upland Material

Structure and Foundation Type	Section 2.5.7.9 Total Volumes		Section 2.5.7.10 Volumes Re-used		Section 2.5.7.11 Volumes Disposed	
	Total No. of Strs.	Est. Foundation Vol. per Str. [CY]	No. Strs. Mat'l Re- used	Est. Vol. Re-used [CY]	No. Strs. Mat'l Disposed	Est. Vol. Disposed [CY]
Preferred Route						
Steel 161/69 kV pole with concrete foundations (Wetland/Upland)	31/75	75	0/0	0	31/75	2,325 / 5,625
Direct embed wood or light duty steel 69 kV structures (Wetland/Upland)	8/129	5	0/0	0	8/129	40 / 645
Total (Wetland/Upland)	39/204		0/0	0	39/204	2,365 / 6,270
Alternate Route A						
Steel 161/69 kV pole with concrete foundations (Wetland/Upland)	26/54	75	0/0	0	26/54	1,950 / 4,050
Steel 161 kV structures, concrete foundations (Wetland/Upland)	6/26	75	0/0	0	6/26	450 / 1,950
Direct embed wood or light duty steel 69 kV poles (Wetland/Upland)	71/189	5	0/0	0	71/189	355 / 945
Steel 69/69 kV pole direct embed (Wetland/Upland)	0/20	6.5	0/0	0	0/20	0 / 130
Total (Wetland/Upland)	103/289		0/0	0	103/289	2,755 / 7,075
Alternate Route B						
Steel 161/69 kV pole with concrete foundations (Wetland/Upland)	33/124	75	0/0	0	33/124	2,475 / 9,300
Steel 161 kV structures with concrete foundations (Wetland/Upland)	2/58	75	0/0	0	2/58	150 / 4,350
Direct embed wood or light duty steel 69 kV poles (Wetland/Upland)	3/29	5	0/0	0	3/29	15 / 145
Total (Wetland/Upland)	38/211		0/0	0	38/211	2,636 / 13,795

2.5.8 Dewatering Plan

2.5.8.1 through 2.5.8.7

At this time, the location and amount of dewatering activities are unknown. Upon final route selection, geotechnical information, including depth to groundwater, would be collected. Xcel Energy would then be able to make a determination regarding the necessity to dewater at construction locations. If dewatering is necessary, it would be completed as described below, in compliance with Wisconsin Administration Code NR 216. The following is a general summary of Xcel Energy's dewatering practices

The presence of groundwater at or near the ground surface can impact the construction procedures used when boring holes for transmission poles. If groundwater flows into an excavation making it unstable, it is often necessary to support the walls of the excavation and/or dewater the site. Depending on site conditions and permit requirements, the extracted groundwater is generally discharged to an upland area where it is allowed to re-infiltrate the local storm or sanitary sewer system. Extracted groundwater may also be discharged to a nearby water body if there is no indication of contamination and sediments. Water that may contain solids from the construction process is most often pumped out of the excavation and trucked to an upland site where it can be allowed to settle and re-infiltrate.

2.5.8.8 Contaminated Water

An environmental contractor with a master services agreement with Xcel Energy would take samples, complete analyses, and treat the area as a contaminated spill area if analyses indicate contamination may reach surface or ground water.

2.6 SUBSTATION INFORMATION

2.6.1 Substation Layouts

Stone Lake Substation – This Project provides for the installation of a 161 kV line termination at Stone Lake Substation. This would add a sixth position on the 161 kV ring bus to accommodate the installation of a new 161 kV line between Stone Lake and the proposed new Radisson Substation. The existing Stone Lake Substation configuration is not conducive to conversion to a breaker-and-a-half type configuration, which is why a six-position ring bus was designed.

The Project includes the installation of a new 161 kV, 3000 Amp breaker in position 6R2 to create a new position on the 161 kV ring bus for the line termination. The project also includes installation of a motor-operator on existing switch 6R2B5, and a new 161 kV, 2000 Amp, motor-operated disconnect switch in position 6R2B6. A 161 kV, 2000 Amp motor-operated line switch and three single-phase coupling capacitor voltage transformers (CCVTs) would be installed on the new line termination. Piloted relaying communications will be accommodated via fiber optic cable in the shield wire of the new transmission line.

The Project will provide for a new 161 kV line dead-end structure, additional structural steel to support the new switches, CCVTs, and bus extension. The Project also includes foundations and

grounding for the new equipment. The existing 161 kV breakers on the ring bus are 3000 Amp breakers, and the bus conductor and disconnect switches on the 161 kV ring bus are rated 2000 Amp.

The electrical equipment enclosure layout drawing indicates there would not be adequate space for the new panels and, thus the Project includes a 20 foot expansion of the electrical equipment enclosure to accommodate the new line relay panels and breaker controls.

Sand Lake Substation – No modifications are required. at the Sand Lake Substation

Edgewater Pumping Station – No modifications are required at the Edgewater Pumping Station

Couderay Substation – the Project would involve removing all components of the existing Couderay Substation. The site would then be offered for sale at fair market value.

Stacik Substation - The Stacik Substation is adjacent to the Couderay Substation, and is owned and operated by NVEC. The 69 kV interconnection will be provided by a new 69 kV line from the Radisson Substation. The Stacik Substation would not be affected by this Project.

Radisson Substation – The layout and preferred and alternate locations for the new Radisson Substation are shown in Appendix C. This Project provides for the installation of a new 161/69 kV substation. The new substation would ultimately be designed to accommodate two 161/69 kV line terminations, two 161/69 kV transformers, and three 69 kV line terminations. The initial phase of the project includes: one 161 kV line termination, a 161/69 kV, 70 MVA, autotransformer, and three 69 kV line terminations. The Project includes grading and fencing approximately a 400 foot x 320 foot area.

The substation design would accommodate the initial installation of a new 161 kV line between Stone Lake and Radisson substations, three 69 kV lines to Stone Lake, Osprey, and Stacik substations, and a future 161 kV line between Radisson and Osprey substations.

The 161 kV installation would include a 161 kV, 1200 Amp motor-operated disconnect, four single-phase, 161 kV CCVTs, a 2000 Amp breaker, and five 161 kV, 2000 Amp disconnect switches. The switches would be the Stone Lake line switch, the A and B breaker disconnects, the transformer high side switch, and in preparation for expansion of the 161 kV system to install a 161 kV line to Osprey, an additional 161 kV switch would be installed to allow for the future installations without outages to the transformer. The estimate includes primary and secondary line relaying which would use the fiber optic cable in the transmission line shield for piloted relay communications. See the attached one line for details.

The 69 kV installation would include a 69 kV, 2000 Amp circuit breaker and a 69 kV, 2000 Amp, motor-operated, disconnect switch on the low voltage side of the transformer. Three new 69 kV, 2000 Amp breakers, each with two 69 kV, 2000 Amp, group-operated, disconnect switches, would be installed to accommodate the 69 kV line terminations for the 69 kV lines to

Osprey, Stone Lake, and NWECC's Stacik substations. The estimate includes metering units on the 69 kV line to Stacik to provide interconnection metering with NWECC.

The Project includes installation of a new 120/240 volt station auxiliary system with preferred and emergency transformers, and an automatic transfer switch. One station auxiliary transformer would be connected to the tertiary winding of the new 161/69 kV transformer; the other would be fed from a 69 kV station service voltage transformer (SSVT) connected to the 69 kV bus.

The Project also includes installation of a new 24 foot x 60 foot control house with transformer protection, line protection (three 69 kV lines and one 161 kV line), programmable logic controller (PLC) based remote terminal unit, annunciator, PLC load tap changer controls, phone protection, 125-V DC battery, battery charger, and station auxiliary automatic transfer switch.

The new property that has been identified to be purchased is an 80 acre parcel, which provides adequate size to allow for future expansion of the 161 kV system into a three position ring-bus configuration to accommodate a future 161 kV line to Osprey Substation.

2.6.2 Size and Orientation

The Radisson Substation will be built on a new graded site. The new substation fenced area would be approximately 400 feet x 320 feet. The 161 kV breaker row(s) would be configured in an east - west direction on the site, with the 161 kV main buses in a configured in a north - south direction. The 69 kV buses would also be configured in a north – south direction with the 69 kV lines coming in from the east and west directions. See the layout in Appendix C for details.

2.6.3 Landscaping

No changes to existing landscaping are anticipated or proposed for the Stone Lake Substation, Sand Lake Substation, or Edgewater Pumping Station. Xcel Energy is in the process of discussing landscaping options for the Radisson Substation with the parcel landowner and adjacent landowners. Any landscaping for this substation will be in accordance with applicable local planning and zoning requirements.

2.6.4 Plat and Topographic Maps

Xcel Energy owns the property for all existing substations. The property for the Radisson Substation is owned by a private party, and Xcel Energy has a verbal commitment for an Option to Purchase from the landowner. Xcel Energy currently owns the property for the Couderay Substation. Once that substation is dismantled, Xcel Energy would put the land up for sale at fair market value. See Appendix B-5 for topographic maps for the substation sites, and Appendix B-7, Parcel Boundary Maps for ownership by tax parcel for the substation sites.

2.6.5 Transmission Lines and Structures

The Stone Lake Substation will add equipment for one proposed new 161 kV line termination, as described in Section 2.6.1.

The Radisson Substation will add equipment for two proposed new 161 kV line terminations, and three proposed new 69 kV line terminations, as described in Section 2.6.1.

2.6.6 Access Roads

No new access roads will be necessary to the Stone Lake Substation, Sand Lake Substation, or Edgewater Pumping Station.

Construction of the new Radisson Substation across the street from the existing Couderay Substation will require a new access driveway from Polish Road on the north and may actually use the right of way corridor of the existing transmission line. The standard substation access driveway is 20 feet wide with a 50 foot turning radius at the road access, which is required to accommodate access by large equipment (power transformers), as well as for maintenance and emergency repairs. A parking area outside the substation fence will be provided for off-road parking for maintenance and operations purposes.

2.6.7 Construction Procedures

Radisson Substation: Construction would begin with the stripping of an estimated 12 inches of topsoil containing organic materials. Common fill and graded aggregate base would be used to create the substation pad area, sloped for drainage. The depth of the aggregate base course material would be a minimum of 12 inches (56,890 cubic yards), and the graded area surfaced with 4 inches of crushed rock (18,960 cubic yards). A permanent wet sedimentation basin (size to be determined) would be part of the design.

Appropriate erosion and storm water control measures as described in the Storm Water and Erosion Control Plan would be utilized.

Stone Lake Substation: The project would install additional equipment as described above in Section 2.6.1, inside the existing fenced and graded area. Any disturbed surface material would be replaced with new crushed rock to maintain the existing substation design standards.

Sand Lake Substation and Edgewater Pumping Station: The Project would not affect the control or relaying for either of these substations. No substation or fence expansions would be required.

Section 2.5.6 above provides information on the erosion control practices that will be used during construction of the Radisson Substation.

2.6.8 Environmental Information

Modifications at existing substations will be conducted within the existing substation fence lines, as described in Section 2.6.7 above. No permanent incremental impact to the environment is expected from this substation work. The parcel that contains both the preferred and alternate Radisson Substation sites is presently agriculture fields with some forested areas. Impacts at the preferred and alternate Radisson Substation sites are discussed below.

2.6.8.1 Land Use and Zoning

The Radisson Substation site is zoned agricultural.

2.6.8.2 Impacts to Agriculture

Portions of the Radisson Substation location are currently used for agricultural operations by the landowner. Construction at the preferred Substation site would result in approximately 1.1 acres of land currently used for agriculture being converted to substation use. Construction at the alternate Substation site would result in approximately 1.2 acres of agriculture being converted to substation use.

2.6.8.3 Impacts to Forest Lands

There are forested areas in the vicinity of both the preferred and alternate Radisson Substation sites. It is estimated that the preferred site would require approximately 1.8 acres of upland forest clearing due to the footprint of the substation grading area; construction at the alternate site would require approximately 1.7 acres of upland forest clearing due to the substation grading area. It is also anticipated that some forest clearing will be necessary due to the associated retention pond that will be designed once the final site is selected. Xcel Energy will minimize the amount of forested area affected by the substation to the greatest extent feasible. However, due to Sawyer County roadway setback requirements as well as adjacent residents' stated preferences for the Radisson Substation to be set back from the road as much as possible, it was not feasible to design either site to completely avoid forest impacts

2.6.8.4 Endangered, Threatened, and Special Concern Species

Construction of the Radisson Substation is not anticipated to have an adverse affect on special status species. Endangered, Threatened, and Special Concern plants and animals, or valuable natural communities are discussed in Section 2.4.8.

2.6.8.5 Archeological and Historic Resources

There are no known archeological or historical resources identified on, or close to, the proposed or alternate substation sites. Refer to Section 2.4.9 for information on archeological and historic resources in the Project area.

2.6.8.6 Waterways

Waterways will not be impacted by development of the Radisson Substation at the preferred or alternate substation sites.

2.6.8.7 Wetlands

There is a WWI-mapped wetland on the parcel proposed for development of the Radisson Substation. A wetland delineation was conducted for the site in July 2011, including areas in the vicinity of both the preferred and alternate substation sites. A copy of the delineation report is included as an attachment to the Part 1 of the WDNR permit application (Appendix G). The preferred substation site would not impact delineated wetlands. The transmission line connection to the preferred site would cross a wooded wetland (Segment 18B, described in

Sections 2.5 and 2.8). The alternate Substation site would impact approximately 2,250 square feet of wetlands.

Xcel Energy will design the final layout of the substation to avoid wetland impacts if at all feasible. Xcel Energy will coordinate with the WDNR and U.S. Army Corps of Engineers (USACE) if there is potential to impact any jurisdictional wetlands.

2.7 ELECTRIC AND MAGNETIC FIELDS

The term EMF refers to electric and magnetic fields that are associated with all electrical devices. For the lower frequencies associated with power lines, EMF should be separated into electric fields (EF) and magnetic fields (MF).

EF and MF arise from the flow of electricity, are dependent on the voltage and current carried by a transmission line and are measured in kilovolts per meter (kV/m) and milliGauss (mG), respectively. The intensity of the EF is proportional to the voltage of the line, while the intensity of the MF is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

The current passing through a conductor produces a MF in the area surrounding the conductor. The MF associated with a high voltage transmission line surrounds the conductor and decreases rapidly with increasing distance from the conductor. The MF associated with a transmission line is expressed in units of magnetic flux density, or mG.

There is no federal standard for transmission line EF. However, the Minnesota Environmental Quality Board (MEQB) has imposed a maximum EF limit of 8 kV/meter measured at one meter above the ground. The standard was designed to prevent serious hazard from shocks when touching large objects parked under AC transmission lines of 500 kV or greater. The Project's maximum EF, measured at one meter above ground, is calculated to be 1.92 kV/m (on Segments 14A and 16C, as shown in Appendix E-1, Table 10).

The Project's maximum MF, measured at one meter above ground, is calculated to be 39.53 mG (on Segments 15A and 46, as shown in Appendix E-1, Table 14).

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 Hz) MF cause biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant or weak associations between MF exposure and health risks.

The possible impact of exposure to EMFs upon human health has been investigated by public health professionals for the past several decades. While the general consensus is that EF poses no risk to humans, the question of whether exposure to MF can cause biological responses or health effects continues to be debated.

The most recent reviews of the research regarding health effects from power-frequency MF conclude that the evidence of health risk is weak. The National Institute of Environmental Health Sciences (NIEHS) issued its final report on June 15, 1999, following six years of

investigation. NIEHS concluded that there is little scientific evidence linking extra low frequency MF exposures with health risk.

2.7.1 Transmission Line EMF

2.7.1.1 through 2.7.1.5

A summary of the EMF calculations for the proposed transmission lines is found in Appendix E-1, Tables 1 through 20. Structure type drawings for the proposed lines are found in Appendix B-8. A cross-reference table linking EMF calculations to their corresponding structure type drawing is found in Appendix E-1, Exhibit C-1. The EMF calculations included in Appendix E-1 are for all the proposed transmission routes analyzed in this application. Because no changes are proposed to the distribution system, no EMF modeling of distribution lines was conducted.

The strength of the EF, referred to as the Electric Field Intensity, is measured in kV/m and dependent on the charge of the object creating the field, in this case a transmission line. The charge at ground level is strongly influenced by the system voltage level. The nominal voltages of the lines being constructed by the proposed Project are 161 kV and 69 kV. The EF in Appendix E-1, Tables 1 through 10, were calculated using the maximum operating voltage, which is assumed to be 105% of the nominal voltage. For any specific design, the height of the set of phase conductors above ground has a marked influence on the maximum electric field.

The strength of MF, referred to as Magnetic Field Density, is measured in mG and depends on the current flowing in the conductors of transmission lines. The MF calculations for the proposed lines in Appendix E-1, Tables 11 through 20 are based on the current flows for summer peak and average peak (80% peak load) projected for year 2016 and the five years following (2021) under normal system conditions. The current flow model is not available for the Projects' first year of service (2014); hence the 2016 model was chosen.

The values presented in the table are calculated at the low point of the transmission line (typically midspan) where the conductor is closest to the ground. Vertical clearance measurements are based on NSPW minimum design clearances (more conservative than National Electric Safety Code (NESC) Section 23 requirements) at highest conductor operating temperature.

EF and MF calculations for the proposed transmission lines presented in Appendix E-1, Tables 1 through 20 are obtained from ENVIRO, a software program, licensed by Electric Power Research Institute, Inc.

2.7.2 Existing Substations

The substation revisions at Stone Lake Substation will not create any significant changes to the EMF as this is a small addition compared to the existing equipment. The removal of the Couderay Substation will also have minimal impact, as the Couderay substation is a very small area that will be replaced by a new 69 kV line from the Radisson Substation. There are no other existing substation changes proposed as part of the Project (other than relay changes on the remote ends of the transmission lines described in 2.1.4).

2.7.3 New Power Plants (requiring no line additions)

Not applicable. No new power plants are involved with the Project.

2.7.4 Stray Voltage (NEV)

Neutral to earth voltage (NEV) exists when there are small voltage differences between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors. NEV can be a source of stray voltage at animal contact points where the animals are simultaneously touching grounded metal objects and the earth.

In some circumstances transmission lines can induce NEV on a distribution circuit that is parallel to and immediately under the transmission line. NSPW staff considers and analyzes the potential for this phenomenon to occur on its transmission line projects.

A screening for any confined animal operation within one-half mile of the proposed Project as well as a determination if any distribution lines are located within a short distance (150 feet or less) from the transmission line was conducted for the Project. The study found one commercial agriculture business with confined livestock that meets the “Physical Proximity Criteria,” a beef operation on McLeod Road. The operation is served off a single phase distribution line running parallel to Alternate Route A. If Alternate Route A is selected, Xcel Energy will work with Barron Electric Cooperative to offer stray voltage testing before and after the Project to this customer, and will work with the PSCW and the Cooperative on potential mitigation options. The NEV study conducted for the project is included in Appendix E-2.

2.8 WDNR PERMITS AND APPROVALS

A WDNR Utility Permit is anticipated to be required for this Project. Xcel Energy submitted Part 1 of an Application on September 13, 2011 for all WDNR permits required for construction of the facilities proposed in this Joint Application. These permits include:

- Wetland and Water Quality Certification to discharge fill in wetlands, pursuant to Wisconsin Statute § 281.36 and Wisconsin Administration Code chs. NR 103 & 299;
- WPDES Storm Water Discharge Permit pursuant to Wisconsin Statute § 283 and Wisconsin Administration Code ch. NR 216
- Incidental Take Authorization pursuant to Wisconsin Statute § 29.604, if necessary;
- Any other required permit identified by the WDNR

A copy of the WDNR Utility Permit Application, Part 1, is included in Appendix G. Detailed technical information supporting the application for permits is contained in this Technical Support Document and is being provided to the WDNR as Part 2 of Xcel Energy’s Utility Permit Application by copy of this Joint Application.

2.8.1 Waterways and Wetlands

For all three routes considered in this Application, transmission poles would be placed in wetlands, as described in Section 2.4.13. Additionally, the alternate site for the Radisson

Substation would impact wetlands, as described in Section 2.6.8. The proposed locations are enumerated in Part 1 of the WDNR permit (Appendix G) and the wetlands are shown on the Environmental Features Maps (Appendix B-3). Placement of fill in wetlands may require USACE approval under Section 404 of the Clean Water Act; water quality certification from the WDNR under Section 401 of the Clean Water Act, Wisconsin Statute § 281.36 and Wisconsin Administration Code chs. NR 103 & 299. Transmission structures would span all waterways, and no temporary bridge crossings are anticipated to be necessary.

2.8.2 Wetlands Alternatives Analysis

2.8.2.1 Wetlands Factored into the Corridor and Route Selection

Wetland (and other environmental) impacts along with engineering feasibility and cost were evaluated for substation site and route alternative analysis. Site and route selection were based on a balancing of factors including consideration of proximity to residences, topography, soil conditions, zoning, accessibility, transmission line access, and presence of wetlands and other important natural resource features. Further discussion of this initial evaluation is included in Sections 2.2.2 and 2.2.3.

2.8.2.2 Wetland Avoidance and Minimization

Direct impacts due to permanent structure placement within wetlands along the ROW for the final route selected would be minimized to the extent possible. The maximum span possible was used to minimize the number of poles in wetlands; however, span distance is dependent upon several factors, including topography and ROW constraints. These factors restrict flexibility to completely avoid pole placement in wetlands. Temporary impacts to wetlands may occur during construction of the transmission line and removal of existing structures that are within wetlands. No staging or stringing setup areas would be placed within wetlands. After construction, wetland vegetation along the transmission ROW would be reestablished.

Xcel Energy avoids placing temporary access routes through wetlands whenever feasible. However, given the extensive presence of wetlands in the Project area, some access road crossings will occur. Xcel Energy has designed the access routes shown on the detailed maps in Appendix B-3 to avoid crossings of wetlands to greatest extent feasible while still allowing access to every pole. Construction mats will be used in these areas (if not conducted during frozen ground periods) to minimize temporary impacts. Additionally, for transmission structures proposed in wetlands adjacent to roads, access would be from the adjacent roadway near the pole location, minimizing the need to cross entire lengths of wetland. After construction, these temporary impact areas would be revegetated with native seed mixes, and regraded to pre-existing contours for maintenance of previous wetland hydrology. Wetland vegetation would likely be fully restored in temporarily impacted areas within three to five growing seasons.

The preferred site for the Radisson Substation has been designed to avoid impacts to wetlands. The alternate location for the new substation would result in some wetland impacts, as described in Section 2.6.8. Although Xcel Energy has designed the footprint of this alternate site to minimize wetland impacts, complete avoidance was not possible due to County setback

requirements and the desire of adjacent residents for the new Radisson Substation to be placed farther away from the road.

Prior to construction, wetland delineation will occur for potential wetland areas that cannot be spanned. Xcel Energy will obtain any necessary permits for permanent or temporary wetland impacts from USACE and WDNR prior to construction.

2.8.2.3 Construction and Restoration

Wetlands would be spanned, when practicable. Depending on the route selected, construction of the Project may involve wetland impacts such as temporary habitat disturbance associated with construction activities, poles placed in wetlands and permanent modification of habitat from forested to non-forested wetlands associated with clearing the ROW. In instances where spanning is not feasible, Xcel Energy would either use construction mats or attempt to schedule construction during frozen ground conditions, and access any affected wetland with the least amount of physical impact to the wetland. As much as possible, structures would be placed at the edges of wetlands in order to minimize disturbance. Existing structures to be removed that are within wetlands would be cut off at ground level or completely removed as warranted to minimize impacts.

Impacts to surface waters and wetlands will be minimized or avoided by using appropriate sediment control practices and BMPs. These practices would be detailed in the Construction Erosion Control and Storm Water Management Plan that would be completed prior to the start of construction. See Section 2.5.4 for more details on BMPs to be used to minimize disturbance during construction and restoration.

2.8.3 Stormwater Management

Authorization for Storm Water Discharges Associated with Land Disturbing Construction Activities (NR 216) will be required as disturbance will exceed one acre. Once the final route is selected, Xcel Energy will develop a storm water management plan.

2.8.4 Endangered/Threatened Species Incidental Take

No incidental take permits are expected to be required for this Project. Information concerning the presence of rare species (threatened, endangered, or special concern species) in areas near the Route Alternatives was obtained through review of the Wisconsin NHI database.

Information contained in the NHI database identified several previously reported rare plant and animal species located within a two-mile buffer zone of the proposed new or existing transmission line route segments. See Section 2.4.8 for additional NHI information. Xcel Energy will continue to coordinate with WDNR to determine the scope and location of potential surveys for listed species habitat once the final route is selected.

2.9 OTHER AGENCY CORRESPONDENCE

2.9.1 Xcel Energy Correspondence

Copies of Xcel Energy correspondence to other governmental agencies are included in Appendix F-1.

2.9.2 Agency Responses

Copies of governmental agency responses to Xcel Energy correspondence are included in Appendix F-1.

2.9.2.1 Wisconsin Department of Transportation (Highways and Aeronautics)

A letter was received dated June 21, 2010 stating the Project would have no aeronautical effect on the surrounding airports and there is no objection. The letter can be found in Appendix F-1.

2.9.2.2 Wisconsin Historical Society

Xcel Energy acquired the GIS shapefile subscription for the Wisconsin Historic Preservation Database from the Wisconsin Historical Society and used this data for the archeological and historical sections of this application.

2.9.3 Permits

2.9.3.1 Local Zoning Permits

Pursuant to Wisconsin Statute § 196.491(3)(i), no local land use, zoning, or environmental authorizations are required for construction of a new substation or a new/rebuilt transmission line approved in a CPCN issued by the PSCW.

2.9.3.2 Federal Permits

The portion of the Project within the LCO Reservation requires authorization from the BIA. The Environmental Assessment for this portion of the Project is currently in review. The NEPA questionnaire, submitted to the BIA by Xcel Energy on August 23, 2011, is included in Appendix F-1. Through the BIA review, coordination with the Wisconsin Historical Society will occur under through Section 106 of the National Historic Preservation Act, and coordination with the USFWS will occur under Section 7 of the Endangered Species Act. Additionally, coordination with the USACE will occur under Section 404 of the Clean Water Act for jurisdictional water crossings.

2.9.3.3 Other Permits

Other permits that may be required depending upon which route is approved, including:

- LCO Tribal permit to either maintain the existing 69 kV transmission line or upgrade to a 161/69 kV double circuit transmission line on the current transmission ROW on tribal land within LCO Reservation – obtained December 2010
- WisDOT road crossing, construction in state highway ROW, and oversize load permits;
- County road crossing or ROW permits;
- Railroad crossing and ROW permit; and

- Wisconsin Historical Society approval of archeological surveys.

2.10 PROPERTY OWNER INFORMATION

Appendix H provides a list of landowners along the Route Alternatives.

2.10.1 Alphabetized Lists

Mailing lists of all affected (and nearby) private and public property owners are included in Appendix I. Appendix I also includes mailing lists for local media and libraries, public officials including town, village and county clerks, and governmental agencies.

APPENDIX A

Certificate of Public Convenience and Necessity Impact Tables

- Table 1A – General Route Impacts
 - Preferred Route
 - Alternate Route A
 - Alternate Route B
- Table 1B – Distance to Potentially Sensitive Buildings
 - Preferred Route
 - Alternate Route A
 - Alternate Route B
- Table 2 – Land Cover Impacts
 - Preferred Route
 - Alternate Route A
 - Alternate Route B
- Table 3 – Public and Tribal Lands
 - Preferred Route
 - Alternate Route A
 - Alternate Route B
- Table 4 – Route Impact Study
 - All Routes

APPENDIX B

Transmission Facility Maps

- B-1 Initial Corridor Map
- B-2 Alternatives Considered but Not Proposed Map
- B-3 Detailed Figures – Environmental Features
 - Preferred Route
 - Alternate Route A
 - Alternate Route B
- B-4 Land Cover Maps
- B-5 USGS Topographic Maps
- B-6 Zoning and Land Use Maps
- B-7 Parcel Boundary and Street Maps
- B-8 Proposed Structure Design Drawings
- B-9 Visual Simulations
- B-10 Special Status Species Report [CONFIDENTIAL]
- B-11 Cultural Resources Report

APPENDIX C

Substation Facilities

APPENDIX D

Transmission Study

APPENDIX E

EMF and Stray Voltage Studies

- E-1 EMF Tables (CPCN Impact Table 4)
- E-2 NEV Study

APPENDIX F

Agency and Public Correspondence

- F-1 Agency Correspondence
 - Agency Letters
 - Agency Responses
 - BIA NEPA Questionnaire
- F-2 Public Correspondence
 - Letters to Landowners
 - Comments from Landowners

APPENDIX G

WDNR Permit Application Part 1

APPENDIX H

Property Owners

APPENDIX I

Mailing Lists