Environmental Assessment

Scott County to Westgate 69-115 kV Upgrade

In the Matter of the Applications of Xcel Energy for a Certificate of Need and a Route Permit for the Southwest Twin Cities Scott County-Westgate 115 kV Transmission Line Upgrade Project in Scott, Carver and Hennepin Counties

PUC Docket Nos. E002/CN-11-332; TL-11-948

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Abstract

Xcel Energy, Inc. (Xcel Energy or Applicant) has submitted applications for a Certificate of Need (CN) and a High Voltage Transmission Line (HVTL) Route Permit to the Minnesota Public Utilities Commission (Commission) for the Scott County-Westgate 69 kV-115 kV Upgrade Project (Project). The proposed Project involves converting the existing double-circuit 115/69 kV transmission line to 115/115 kV operation from Scott County Substation, through Chanhassen Substation, to Structure #57 north of Bluff Creek Substation. Conversion to 115/115 kV operation would not require the rebuilding or replacement of any existing structures. The Project also includes rebuilding the existing single-circuit 69 kV to a single-circuit 115 kV line between Structure #57 to the Excelsior Substation, which would be converted for 115 kV use; rebuilding the line between Excelsior Substation and Deephaven Substation, which would also be converted for 115 kV use; and rebuilding the line between the Deephaven Substation and the Westgate Substation.

Two separate approvals from the Commission are required for the construction of the Project – a Certificate of Need and a Route Permit. The Applicant submitted a CN application (CNA) to the Commission on March 9, 2012. The application was accepted as complete by the Commission on June 8, 2012. Xcel Energy submitted a Route Permit application (RPA) to the Commission on April 12, 2012. The RPA was accepted as complete by the Commission on May 24, 2012.

The Department of Commerce (DOC) Energy Facility Permitting (EFP) staff is responsible for conducting the environmental review for CN applications submitted to the Commission (Minn. Rule 7849.1200) and the environmental review for route permit applications to the Commission (Minn. Rule 7850.3700). As two concurrent environmental reviews are required, the Department has elected to combine the environmental review for the two applications (Minn. Rule 7849.1900). Thus, this Environmental Assessment has been prepared to meet the requirements of both review processes.

Persons interested in these matters can register their names on the Project Docket webpage at http://mn.gov/commerce/energyfacilities/Docket.html?Id=32547 or by contacting David Birkholz, Energy Facilities Permitting, 85 7th Place East, Suite 500, St. Paul, Minnesota 55101, phone (651) 296-2878, e-mail david.birkholz@state.mn.us. Documents of interest can be found at the above website or by going to https://www.edockets.state.mn.us/EFiling/search.jsp and entering "11" and "332" for the CN docket and "11" and "948" for the HVTL Route docket as the year and project identification search criteria.

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

Preparer: David Birkholz

Acronyms, Abbreviations and Definitions

ACSR	Aluminum Conductor, Steel Reinforced
ACSS	Aluminum Conductor, Steel Supported
AC	Alternate Current
ALJ	Administrative Law Judge
BMP	Best Management Practice
BPA	Bonneville Power Association
Commission	Minnesota Public Utilities Commission
CN	Certificate of Need
CNA	Certificate of Need Application
CSAH	County State Aid Highway
dB	decibels
dBA	A-weighted sound level recorded in units of decibels
DC	Direct Current
DG	Distributed Generation
DOC	Department of Commerce
EA	Environmental Assessment
EFP	Department of Commerce Energy Facilities Permitting
EMF	Electromagnetic Field
EPA	United States Environmental Protection Agency
ER	Environmental Report
G	Gauss
HVTL	High Voltage Transmission Line
Hz	Hertz
kV	Kilovolt
kV/M	Kilovolt per Meter
kWh	Kilowatt Hour
mA	MilliAmperes
MCBS	Minnesota County Biological Survey
MDH	Minnesota Department of Health
mG	Milligauss
MHz	Mega Hertz
MnDNR	Minnesota Department of Natural Resources
Mn/DOT	Minnesota Department of Transportation
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
MSIWG	Minnesota State Interagency Working Group
MVA	Megavolt Ampere
MW	Mega Watt
NAC	Noise Area Classification
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code

NEV	Neutral-to-Earth Voltage
NIEHS	National Institute of Environmental Health Sciences
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PM	Particulate Matter
ppm	parts per million
PWI	Public Waters Inventory
RAPID	U.S. EMF Research and Public Information Dissemination
ROW	Right-of-Way
RPA	Route Permit Application
RUS	Rural Utilities Service
SFD	Swan Flight Diverter
SHPO	State Historic Preservation Office
SNA	Scientific and Natural Area
SWPPP	Stormwater Pollution Prevention Plan
USCOE	United States Corp of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCA	Minnesota Wetland Conservation Act
WHO	World Health Organization
WPA	Waterfowl Production Area
WMA	Wildlife Management Area

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1.0 Introduction

Xcel Energy made an application[1] to the Minnesota Public Utilities Commission for a Certificate of Need for the construction of the Scott County-Westgate 69 kV-115 kV Upgrade Project pursuant to Minnesota Statute Section 216B.243 and Minn. Rule 7849.0020-7849.0400.

Xcel Energy also made an application[2] to the Commission for an HVTL Route Permit for the construction of the Project pursuant to Minnesota Statute 216E.04 and Minn. Rule 7850.

The Energy Facility Permitting staff is tasked with conducting environmental review on applications for certificate of need and route permits. The intent of the environmental review process is to inform the public, the applicant, and decision-makers about potential impacts and possible mitigations for the proposed project and its alternatives.

This document meets the environmental review requirements of both the certificate of need procedures and the HVTL route permit process by a) providing information in Section 2 on the regulatory framework, certificate of need and route permit processes; b) describing the proposed Project in Section 3; c) evaluating alternatives for meeting the stated need in Section 4; c) summarizing the potential effects of the proposed route on people and the environment in Section 5; and d) analyzing potential effects of alternative routes for the proposed HVTL in Section 6.

1.1 Project Description

The Project is located in Carver, Hennepin, and Scott counties, within the cities of Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie, and Jackson Township. **Figure 1** below displays the general vicinity of the proposed project. **Appendix A** includes detailed maps of the proposed and alternative routes. **Table 1** below identifies the counties, cities and townships in the Proposed Route area.

The proposed Project entails upgrading approximately 20 miles of 69 kV transmission line to 115 kV capacity including the following upgrades and additions:

- Change the voltage of approximately 5.3 miles of 115/69 kV transmission line to 115/115 kV operation between the Scott County and Bluff Creek substations;

- Converting approximately 3.6 miles of 69 kV transmission line to 115 kV transmission line between the Bluff Creek and Excelsior Substations;

[1] "Application to the Minnesota Public Utilities Commission for a Certificate of Need for the Scott County-Structure #57 115/115 kV Conversion and Structure #57-Westgate 115 kV Upgrade," March 9, 2012 (hereafter CNA) http://mn.gov/commerce/energyfacilities/documents/32547/CN Application_03092012.pdf

[2] "Northern States Power Company Application to the Minnesota Public Utilities Commission for a Route Permit," April 12, 2012 (hereafter RPA) http://mn.gov/commerce/energyfacilities/documents/32547/COVER LETTER AND ROUTE PERMIT APPLICATION.pdf

- Converting approximately 3 miles of 69 kV transmission line to 115 kV capacity between the Excelsior and Deephaven Substations;

- Converting approximately 7.5 miles of 69 kV transmission line to 115 kV capacity between the Deephaven and Westgate Substations; and

- Upgrading the Excelsior and Deephaven Substations to 115 kV capacity

Expanding upon the above description, the Applicant has split the proposed route into 10 proposed segments. See Section 3 for more detailed explanations of the proposed construction elements of each of those segments.

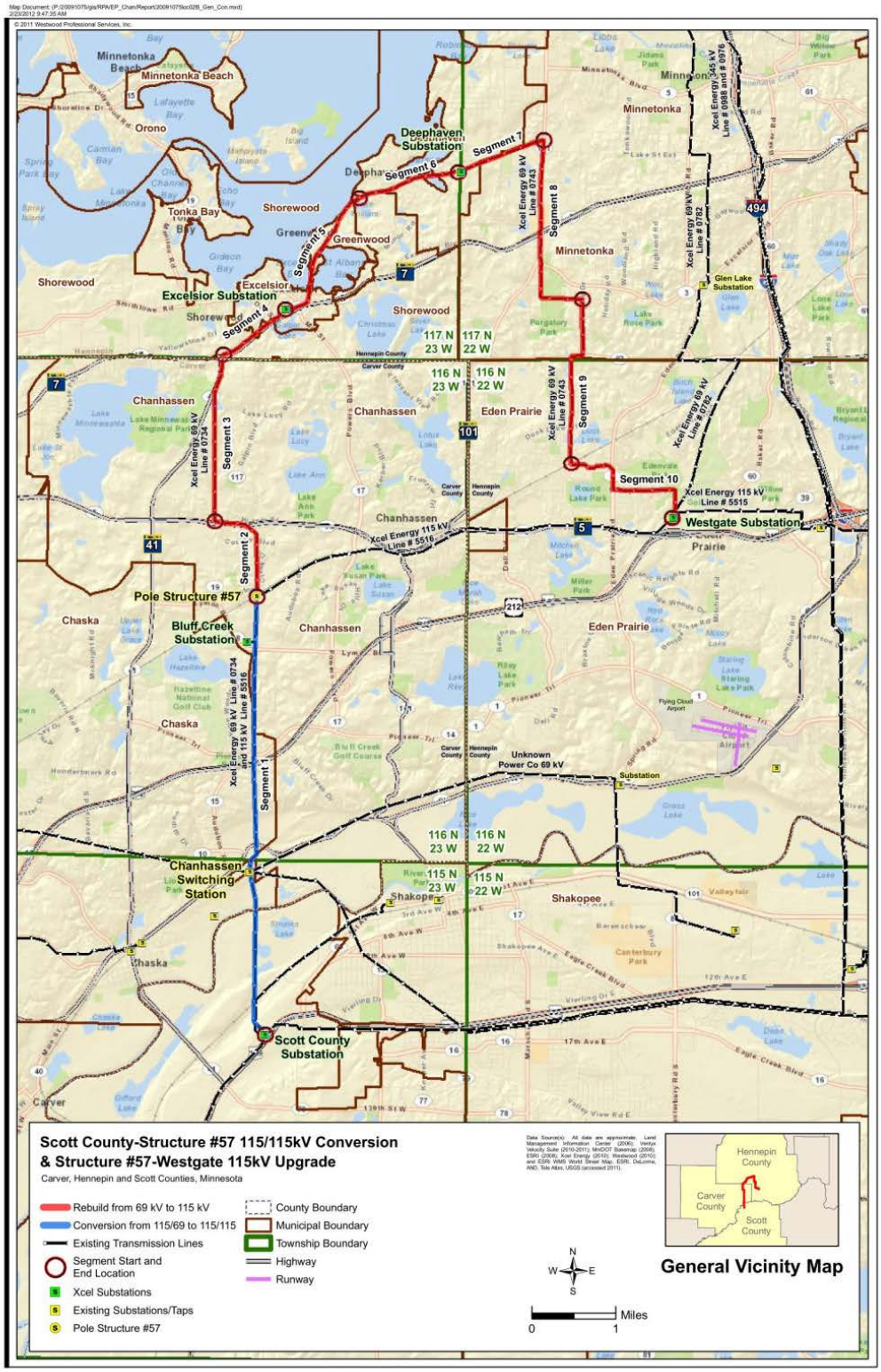
1.2 Project Location

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

Table 1. Project Location

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

Figure 1. General Vicinity of Project



Subsequent to the original applications, the Applicant submitted an additional system alternative for consideration that would use a route along Highway 5 instead of the existing 69 kV route. This alternative uses the existing structures along Highway 5 and requires building a new substation, a short segment of 69 kV line and a relocation of the 34.5 kV feeder line from along the highway. The EA analyzes the comparative impacts of the Proposed Project, the Highway 5 Alternative and alternative segments along Highway 41 and Highway 7.

1.3 Project Purpose

The Applicant has designed and proposed this Project to address the need identified in the *Southwest Twin Cities Phase 2 Study Update Review* dated July 8, 2011. The study revealed overload and low voltage conditions in the Project area when certain transmission lines are out of service. The study found existing overloads and low voltages that need to be addressed immediately, and the transmission planning studies indicated that, without further action, there would be additional overloads of transmission line facilities and low voltages in the Project area in the future as the area experiences continued growth and development.

The Applicant has stated that, depending on the duration of a low voltage condition, equipment such as electronic power supplies could malfunction or fail when output voltage drops below certain levels, damaging customer equipment such as process controls, motor drive controls, and automated machines. Thermal overload on transmission lines could damage facilities due to excessive heat and cause safety concerns due to unsafe ground clearance. In addition, overload on facilities that operate at a voltage greater than 100 kV is a violation of North American Electric Reliability Corporation (NERC) standards.

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

The Applicant proposes this Project would eliminate the overloads on the Scott County Substation transformer and 69 kV lines. The proposed upgraded 115 kV lines also prevent potential future overloads on the 115 kV lines near Scott County Substation by providing a parallel 115 kV path from the Scott County Substation to the Westgate Substation.

1.4 Sources of Information

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

2.0 Regulatory Framework

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

2.1 Certificate of Need

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

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

http://mn.gov/commerce/energyfacilities/Docket.html?Id=32547

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

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

Environmental Review

The environmental review process under the certificate of need procedures includes public information/scoping meetings and the preparation of an environmental review document, the Environmental Report (ER) (Minn. Rule 7849.1200). The environmental report is a written document that describes the human and environmental impacts of the proposed project and alternatives to the project, and methods to mitigate anticipated adverse impacts. The ER must be prepared before the Commission can make a decision on the certificate of need application.

2.2 Route Permit

Minnesota Statutes Section 216E.03, subd. 2, provides that no person may construct a HVTL without a route permit from the Commission. An HVTL is defined as a transmission line of 100 kV or more and greater than 1,500 feet in length in Minnesota Statutes Section 216E.01, subd. 4. The proposed transmission lines are HVTLs and therefore a route permit is required prior to construction.

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

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

http://mn.gov/commerce/energyfacilities/Docket.html?Id=32547

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

Environmental Review

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

The Deputy Commissioner of the Department of Commerce determines the scope of the EA. The EA must be completed and made available prior to the public hearing.

2.3 Combining Processes

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

As two concurrent environmental reviews are required – one for the CN application and one for the route permit application – EFP elected to combine the environmental review for the two applications as noted above. Thus, this EA has been prepared to meet the requirements of both review processes.

2.4 Scoping Process

EFP staff sent notice of the Public Information and Scoping meeting to those persons on the general list, the agency technical representatives list and the project contact list. Notice of the public meeting was also published in the local newspapers.

EFP staff held a public information and environmental assessment scoping meeting on July 18, 2012, at Minnetonka High School in Minnetonka, Minnesota, to discuss the project with the public and gather public input on the scope of the Environmental Assessment to be prepared. Approximately 100 people attended the meeting over two sessions. Comments were recorded by a court reporter at the meeting. Additionally, the public was given until August 1, 2012, to submit written comments.

EFP received over 40 comment letters to review and consider during preparation of the scope of the Environmental Assessment. People raised topics consistent with the draft scoping document, which described issues that EFP would typically include in an EA. Particularly, the public expressed interest in issues about possible health effects, including EMF, aesthetics, property values and potential noise. Alternative routes, alternative route segments and modifications to the Xcel Energy's proposed alignment were also discussed during the scoping meeting and in comments received during the scoping comment period.

After consideration of the public comments, the Deputy Commissioner issued his Scoping Decision on August 14, 2012. A copy of this order is attached in **Appendix D.1**. Items and issues from public comments including route alternative recommendations, along with the typical HVTL routing impacts, were incorporated into the Scoping Decision.

Subsequently, Xcel Energy has analyzed the viability of a Highway 5 Alternative as well. On October 25, 2012, Xcel Energy filed a request to amend the Scoping Decision to include an evaluation of the Highway 5 Route Alternative in the EA. The Deputy determined the alternative request meets the requirements to amend the Scoping Decision as laid out in Minn. Rule 7850, 3700, subp. 3, implying "…substantial changes have been made in the project or substantial new information has arisen significantly affecting the potential environmental effects of the project or the availability of reasonable alternatives." On October 30, 2012, the Deputy issued an amendment to the Scoping Decision that includes a route alternative along Highway 5 for review in the EA. A copy of this order is attached in **Appendix D.2**.

2.5 Public Hearing

The Commission is required by Minn. Rule 7849.5710 subp 1, to hold a public hearing once the EA has been completed. It is anticipated that this hearing will be held in early 2013, in the project area, and will be conducted by an Administrative Law Judge (ALJ). Interested persons may comment on the EA or other issues at the public hearing. Persons may testify at the hearing without being first sworn under oath. The ALJ will ensure that the record created at the hearing is preserved and will provide the Commission with Findings of Fact and a recommendation on the certificate of need and route permit.

Comments received on the EA become part of the record in the proceeding, but EFP staff is not required to revise or supplement the EA document (Minn. Rule 7850.3700 subp. 8). A final decision on a route permit will be made by the Commission at an open meeting after the public hearing and the ALJ Report, depending on scheduling opportunities.

The process anticipates a decision within six months of the Application, but the combined process will likely extend that time period.

The Commission's obligation is to determine the need of the project (including size, type and timing of any solution) and, if needed, choose a route that minimizes adverse human and environmental impacts while insuring continuing electric power system reliability and integrity, and also while insuring that electric energy needs are met and fulfilled in an orderly and timely fashion. The route permit will contain conditions specifying construction and system standards (see sample Route Permit in **Appendix E**).

If issued a certificate of need and route permit by the Commission, Xcel Energy may exercise the power of eminent domain to acquire the land necessary for the project pursuant to Minnesota Statute 216E.12 and Minnesota Statute 117.

2.6 Other Permits

The Public Utilities Commission HVTL Route Permit is the only approval required for routing of high voltage transmission lines, but other permits may be required for certain construction activities, such as river crossings. **Table 2** includes a list of permits that may be required for Xcel Energy to complete this project.

Table 2. Required and Potential Permits

Permit	Jurisdiction
Federal	
Clean Waters Act Section 404 Permit	U.S. Army Corps of Engineers
State	
Certificate of Need	Public Utilities Commission
Route Permit	Public Utilities Commission
License to Cross Public Waters	MnDNR
Utility Permit	Mn/DOT
Construction Stormwater Permit	MPCA
Local	
Wetland Conservation Act Certification	Carver, Hennepin, and Scott Counties
County Road Access Permit	Carver, Hennepin, and Scott Counties

Once the Commission issues a Route Permit, local zoning, building and land use regulations and rules are preempted per Minnesota Statute 216E.10, subd 1. However, the Applicant is still required to obtain relevant permissions, such as road crossing permits.

2.7 Applicable Codes

The transmission line, regardless of route location, must meet all requirements of the National Electrical Safety Code (NESC) and the Rural Utilities Service (RUS) Design Manual for High Voltage Transmission Lines. These standards are designed to protect human health and the environment. They also ensure that the transmission line and all associated structures are built from high quality materials that will withstand the operational stresses placed upon them over the expected lifespan of the equipment provided normal routine operational and maintenance is performed.

Utilities must comply with the most recent edition of the National Electrical Safety Code, as published by the Institute of Electrical and Electronics Engineers, Inc., and approved by the American National Standards Institute, when constructing new facilities or reinvesting capital in existing facilities. See Minn. Statute 326B.35 and Minn. Rule 7826.0300 subp 1.

The NESC is a voluntary utility developed set of standards intended to ensure that the public is protected. The NESC covers electric supply stations and overhead and underground electric supply and communication lines, and is applicable only to systems and equipment operated by utilities or similar systems on industrial premises. For more information, go to http://standards.ieee.org/faqs/NESCFAQ.html#q1. The RUS provides leadership and capital to "upgrade, expand, maintain, and replace America's vast rural electric infrastructure." For more information, go to http://www.rurdev.usda.gov/UEP_Homepage.html.

2.8 Issues Outside the Scope of the EA

The EA will not consider the following:

- Any route or substation alternatives not specifically identified in the scoping decision;
- Any system alternatives not specifically identified in the scoping decision;
- The impacts of specific energy sources, such as carbon outputs from coal-generated facilities; or
- The manner in which landowners are paid for transmission rights-of-way easements.

3.0 Proposed Project

The Project is located in Carver, Hennepin, and Scott counties, and within the cities of Chaska, Chanhassen, Shorewood, Excelsior, Greenwood, Deephaven, Minnetonka, and Eden Prairie, and Jackson Township in the southwest Twin Cities metro area.

Approximately five miles of the line is a double-circuit line built to operate at 115/115 kV, but currently permitted to operate at 69/115 kV, running north from Scott County Substation. No construction is required for this segment. The remainder of the project is proposed to remove and replace an existing 69 kV line that runs through the Excelsior, Deephaven and Westgate substations with a new 115 kV line along the existing alignment. The replacement section of the Project is approximately 15 miles.

Xcel Energy has requested a route width of 200 feet for the existing 69 kV and 115/69 kV facilities portions of the line. Xcel Energy would construct the rebuild of the existing 69 kV line on the current centerline and within the existing 50' ROW where reasonably possible. If new right-of-way is required, Xcel Energy anticipates a ROW of 75 feet wide for new 115 kV transmission line constructions. No additional ROW is required for the conversion of the 5.3 miles to 115/115 kV double circuit line as no physical modifications of the existing line are required, making the request for a 200 foot ROW for this segment (see Segment 1 below) moot.

3.1 Project Segments

The proposed Scott County-Westgate transmission line project measures approximately 20 miles in length. The RPA divides the Project into 10 segments.[3] **Appendix A.2** of the EA illustrates the proposed HVTL segments on aerial photographs.

Segment 1
Segment 1 is a conversion of approximately five miles of existing 115/69 kV transmission line to 115/115 kV operation. The existing 115/69 kV line begins at the Scott County Substation located north of U.S. Highway 169 between the intersection of County Road 69 and Chestnut Boulevard and ends at Structure # 57, located to the east of Bluff Creek Substation.

Segment 2
The 69 kV to 115 kV replacement portion of the route starts at Structure #57 and proceeds north approximately three quarters of a mile. It then heads northwest to State Highway 5. The route then parallels the north side of the highway approximately one half miles to the west.

Segment 3
This segment proceeds directly north approximately one and one-half miles to State Highway 41. The route parallels State Highway 41 for approximately one half miles to the intersection of State Highway 7. (See Section 6 for an alternative to Segment 3 that continues west on CSAH 5 to Hwy 41, then follows Hwy 41 to the intersection of Hwy 7.)

[3] See RPA at 10-12 for greater detail.

Segment 4
Segment 4 runs along the northern side of Hwy 7 for approximately one mile from the intersection of Hwy 41 to the Excelsior Substation, located in the central portion of Excelsior.

Segment 5
From the Excelsior Substation for approximately one and three quarters miles, this segment extends to the east along the north side of Hwy7, then extends to the north, first along the west side of Minnetonka Boulevard through the cities of Excelsior and Greenwood and next along the east side of Fairview Street in Greenwood. (See Section 7 for alternatives that could replace Segments 5, 6 and in one case 7, with options running along Hwy 7 and Vine Hill Road.)

Segment 6
For approximately one and one-quarter miles, the proposed route would continue from the municipal boundary between the Cities of Greenwood and Deephaven east along the Lake Minnetonka LRT Regional Trail to the Deephaven Substation, located at the intersection of Minnetonka Boulevard and Vinehill.

Segment 7
The proposed route extends to the east from the Deephaven Substation for approximately one mile, paralleling the LRT until reaching Hennepin County Highway 101 in Minnetonka.

Segment 8
Segment 8 is approximately two and one half miles long. It heads south, paralleling County 101, until crossing Hwy 7 and then continuing through to Purgatory Park. The route extends to the east from this point, passing through Purgatory Park to Scenic Heights Drive.

Segment 9
Segment 9 is approximately two miles. It proceeds south along Scenic Heights Drive to the intersection with County Highway 62 and west to the intersection with Duck Lake Road. The route then continues to the south, paralleling Duck Lake Road until passing over the Twin Cities and Western Railroad line.

Segment 10
The last segment is just under two miles. The route proceeds to the east across the Eden Prairie High School campus and crosses to the east side of County Highway 4. The route heads to the south, turning east to parallel Valley View Road. The end of the segment, and the proposed route, is when the line turns and runs directly south to the Westgate Substation.

Substation Upgrades
In addition to the line segments, the Project includes upgrades to four substations. Essentially, equipment and configurations need to be installed to upgrade Excelsior and Deephaven substations to support 115 kV. Upgrades are also necessary at each terminus of the line at Scott County and Westgate substations.[4]

[4] See RPA at 27 to 30 for detailed upgrades required at each substation.

3.2 Right-of-Way Requirements

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

The Applicant proposes to replace existing structures with similar structures. See **Table 3** for dimensions of the proposed structures and general ROW requirements for each type.[5]

Right-of-Way Acquisition

Because Applicant intends to rebuild the transmission line within the existing 50-foot right-of-way, the need for new right-of-way acquisition would be limited. All existing easements would be evaluated to determine if the project can be built without obtaining additional land rights. If an easement would accommodate the project, the right-of-way agent would still work with the landowner in order to address any construction needs, impacts, damages, or restoration issues.

To the extent new right-of-way acquisition is necessary; the evaluation and acquisition process would include title examination, initial owner contacts, survey work, document preparation and purchase. Most of the time, utilities are able to work with the landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights. In some instances, a negotiated settlement cannot be reached and the landowner may choose to have an independent third party determine the value of the rights taken. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to Minnesota Statute 117.

3.3 Project Construction and Maintenance

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

The steel structures proposed for the 69 kV to 115 kV rebuild will be approximately 60 to 90 feet tall with spans of approximately 200 to 400 feet for post structures and 400 to 900 feet for H-frame and Y-frame structures. This spacing is appropriate to keep the conductor within existing right-of-ways where applicable. **Table 3** summarizes the structure design for the line.

[5] See RPA at 36 to 38 for diagrams of the potential pole types and the required ROW widths.
[6] See RPA at 32 and 33 for photographs of typical structures of each type.

Table 3. Pole Dimensions and General ROW Requirements

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

Permit conditions require that the proposed transmission line will be designed to meet or surpass relevant local and state codes including the National Electric Safety Code and North American Electric Reliability Corporation. The Applicant's code requires appropriate standards to be met for construction and installation, and applicable safety procedures followed during and after installation.

The 115 kV conductor proposed for the Project will be 795 kcmil 26/7 Aluminum Conductor Steel Supported (ACSS).

Construction

Construction cannot begin until all federal, state and local approvals are obtained, property and rights-of-way are acquired, soil conditions are established and design is completed. The precise timing of construction would take into account various requirements that may be in place due to permit conditions, system loading issues, available workforce and materials. Actual construction would follow standard construction and mitigation practices, addressing right-of-way clearance, staging, erecting transmission line structures and stringing transmission lines. Construction and mitigation practices to minimize impacts would be based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain and other practices. Some construction restrictions and requirements will be reviewed in discussion concerning mitigation later in this document.

Maintenance

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

3.4 Project Implementation

The Applicant anticipates a late 2014 in-service date. Construction would be expected to begin in mid 2013. This schedule is based on information known as of the date of the application filing and upon planning assumptions that balance the timing of implementation with the availability of crews, material and other practical considerations. This schedule may be subject to adjustment and revision as further information is developed.

Project Costs

Xcel Energy estimates that the current transmission line and substation modifications will cost approximately $25.48 million. However, estimates at the time of the Application are very broad. Depending on timing, conditions and final engineering, the total Project costs could be between $18 and $34 million. **Table 4** below describes the expected costs for the Project and its component parts, including $21.7 million for the anticipated Scott County 345/115 kV addition in 2023.

Table 4. Estimated Project Costs[7]

Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
Deephaven Substation Conversion	6.34	2014
Excelsior Substation Conversion	4.39	2014
Westgate-Deephaven Line Conversion	5.70	2014
Deephaven-Excelsior Line Conversion	2.77	2014
Excelsior-Bluff Creek Line Conversion	4.12	2014
Project Costs through 2014	**$25.48**	
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$60.18**	

[7] Estimated costs for the Proposed Project updated January 7, 2013.

4.0 Alternatives to the Proposed Project

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

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

This section discusses the feasibility and availability of potential alternatives to the transmission line which could meet or eliminate the need for the proposed project.

4.1 No Build Alternative

Under the no build alternative none of the existing structures would be replaced and the transmission line would continue to be operated at 69 kV. There would be no construction or improvement to the existing substations.

In that scenario, low voltage and overloading conditions will arise throughout the study region. According to the area study, the 2013 model indicates that the initial overloads will occur on the Westgate transformer #2 and the 69 kV line serving Deephaven substation. In addition, the Scott County transformers and the 115 kV line between Scott County and Minnesota River substations is also expected to overload. As the load increases in the area, the overloads and low voltages progressively get worse.

Depending on the duration of a low voltage condition, equipment such as electronic power supplies could malfunction or fail when output voltage drops below certain levels, damaging customer equipment such as process controls, motor drive controls, and automated machines. Thermal overload on transmission lines could damage the facilities due to excessive heat and could also cause safety concerns due to unsafe ground clearance of transmission lines. Overload on facilities that operate at a voltage greater than 100 kV is a violation of NERC standards.

According to the Applicant, "The loss of the Eden Prairie-Westgate 115/115 kV double-circuit transmission line is the most critical contingency identified in the Study. This line is the only tie between Eden Prairie 345/115 kV Substation, which serves the largest load in the area, and Westgate 115/69 kV Substation. When the Eden Prairie-Westgate 115/115 kV double-circuit line is out of service, the 345 kV source to the area is disconnected.

"As a result, the entire load at the Westgate Substation would be served from Scott County Substation, resulting in overloads or potential overloads on the transmission lines in the area and in low voltages between the Minnesota River Substation and the Westgate Substation."[8]

This is not a feasible alternative. This alternative does not address the voltage support issues that are being experienced in the area. In addition, as the load increases in the area, the overloads and low voltages progressively get worse. Under this alternative it is likely that there would be a negative effect on the local economy due to the unreliable electrical service in the area.

4.2 Conservation Alternative

This alternative would seek to address the need of approximately 50 MW with Demand Side Management (DSM). The alternative would use a slate of energy conservation measures attempting to ultimately reduce load in the area to a level allowing the current system to operate in a reliable manner. This conservation effort would most likely be phased in and would be above and beyond the companies' current efforts. In addition, any load growth occurring in the area would also need to be met through aggressive conservation effort.

Xcel Energy has obtained significant energy savings from various conservation programs, including the Conservation Improvement Program (CIP) as required by Minnesota Statutes 216B.241. While the company anticipates futures savings from the continuation of these efforts, conservation alone will not be sufficient to address the reliability issue that exists in the area. Demand in the study area is projected to increase well beyond projected reductions realized from the Applicant's DSM programs. Thus, while energy conservation is a tool to help in meeting future needs, it will not be able to address issues related to meeting existing demand at the levels indicated in the Study.

Echoing the comments of the Department's Energy Regulation and Planning analyst, Dr. Steve Rakow, in the Glencoe-Waconia docket:

1. The load reduction is too large to be able to be obtained through energy conservation projects in a small geographic area …

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

Thus, while energy conservation is an effective alternative for meeting future needs, it will not be able to address issues related to meeting existing demand at the levels indicated above. In summary, the required load reductions are too large, in too small an area, and required to be in place too soon for conservation to be a reasonable alternative.[9]

[8] CNA at 30

[9] "Environmental Assessment: Glencoe-Waconia Transmission Project," PUC Dockets CN-09-1390 and TL-10-249, July 2011, at 18-19

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

4.3 Purchased Power

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

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

4.4 Facilities of a Different Size or Type

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

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

Use of a DC design is not a realistic option for short, low voltage transmission lines. DC transmission is used generally to move electricity long distances, and doesn't have local substation support that is required to meet the local need.

4.5 Upgrading Existing Transmission Lines

The proposed Project utilizes this approach, upgrading the existing 69 kV line between Structure #57 and the Westgate Substation to 115 kV and converting the existing 115/69 kV line between the Scott County Substation and Structure #57 to 115/115 kV operation. This is the proposal being reviewed in this document. However, the Applicant also reviewed another option.

"Option 2"Alternative

Xcel Energy reviewed another upgrading option[10] in the CN Application as a possible solution to the low voltage and overload conditions in the area. Both their proposed option and this option were considered by the Applicant as preferable to other solutions, as they both make the cost- effective use of existing transmission right-of-way.

Option 2 consists of upgrading all facilities in the study area that overload to a higher capacity. This includes upgrading the Westgate 115-69 kV transformer to a higher capacity (70 or 112 MVA), upgrading the double-circuit 115 kV transmission line from Scott County Substation to the Minnesota River Substation to 2-795 ACSS conductor and upgrading the Minnesota River–Chanhassen–Bluff Creek 115 kV line to 2-795 ACSS conductor.

Initial costs for Option 2 are less but equalize over time when considering planned future expansions to handle load growth; and the proposed option has greater load serving capacity. The Applicant also argues that, since the major substations in the area are primarily 345/115 kV capacity, Option 2 "would create an isolated 69 kV transmission loop between the Scott County and Westgate substations, which would present future challenges for transmission expansion if the area experiences high load growth."[11]

Option 2 is a feasible alternative to the proposed Project, and would likely present similar environmental impacts if the proposed Project were implemented along the existing ROW.

Highway 5 Alternative

During discussion at the Public Information/Scoping Meeting, and in subsequent written public comments, the existing 115 kV line along Highway 5 was suggested as a possible route alternative. EFP staff did not recommend this option as a route alternate for the Scoping Decision because it did not have enough information to determine if the route alternative could meet the stated need in the CN Application. EFP recommended the Highway 5 Alternative be reviewed as a system alternative and requested Xcel Energy develop further information to assess how the alternative could meet some or all of the need of the proposed Project.

Xcel Energy drafted an addendum to the engineering Study. Based on its analysis, Xcel Energy has determined that to meet the need the Highway 5 Alternative would initially require:

- A new 115/69 kV substation in close proximity to near the existing Bluff Creek substation (New Substation);
- A new 69 kV line from Structure #57 to the New Substation, and termination of the existing 69 kV line from Excelsior Substation into the New Substation;
- Operating the existing 115 kV transmission line from Scott County Substation to Structure #57 at 115 kV, by terminating it into the New Substation. The line currently operates at 69 kV;

[10] CNA at 37-44
[11] CNA at 45

- Operating the existing 115 kV line from Structure #57 to Westgate Substation along Highway 5 at 115 kV. It is built to double circuit, with both circuits capable of operating at 115 kV. Only one of the two circuits is currently operating at 115 kV, and the other circuit is being used as a 34.5 kV distribution feeder;
- Constructing a new 34.5 kV distribution feeder from Westgate Substation to replace the 115 kV line from Structure #57 to Westgate Substation which is currently operating at 34.5 kV;
- Upgrading the Westgate Substation 115/69 kV transformer serving Excelsior and Deephaven substations to 70 MVA or larger capacity;
- Upgrading sections of the existing 69 kV line between Westgate and Deephaven substations to a higher capacity 69 kV line (68 MVA or higher).

With these upgrades, Xcel Energy now believes that the Highway 5 Alternative could meet the needs identified in the Project area. They have requested that the Department of Commerce Deputy Commissioner amend the Scoping Decision to include the Highway 5 Route Alternative in the EA. The Deputy Commissioner did so on October, 30, 2012 (see Appendix D.2). The Highway 5 Alternative is now being considered as a route alternative as well as a system alternative. (The full comparative impacts of this alternative are addressed in Section 6.3)

On January 9, 2013, Xcel Energy filed additional comments, providing the full engineering study referenced above. In essence, the Applicant considers its original proposal and the Highway 5 Alternative as equally feasible to address the need in the area. While the costs of each option are roughly equivalent (see **Tables 4** and **48**), each has a particular benefit. The original proposal updates the existing 69 kV to 115 kV, enabling future expansion of the system. The Hwy 5 alternative defers upgrades to the 69 kV system, but immediately upgrades the current distribution system in the area.[12]

4.6 Generation Alternatives

Any generation alternative to the transmission line would be required to generate approximately 50 MW of capacity for delivery to the area. It is unlikely that new generation could totally eliminate the need for rebuilding the existing 69 kV system. In order to reduce or minimize the need for the proposed upgrades to the transmission system, the generation would have to be local or distributed generation (DG). This DG would require multiple units placed strategically to mitigate specific overloads and low voltages.

Distributed generation is not a feasible alternative to the proposed Project. The alternative would be somewhat less reliable without additional generation units being implemented to account for the lower reliability of generation when compared to transmission; and the alternative likely would be less adaptable to high growth due to reliance on the existing 69 kV system rather than 115 kV transmission.

[12] Xcel Energy letter, January 9, 2013, eDocument no. 20131-82592-01 at 6-8.

Above all, the area is a heavily residential area. There would be significant environmental and human impacts in siting generation plants, along with the requisite gas or oil infrastructure and interconnection facilities in the locations where the output would be required.

Renewable Generation Alternative

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

5.0 Potential Impacts of the Proposed Route

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

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

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

There are a number of potential impacts associated with HVTLs that must be taken into account on any transmission line project. Minnesota Rule 7850.4100 identifies 14 factors that the Commission must consider when designating a route for an HVTL (see **Figure 2** below).

5.1 Description of Environmental Setting

The project area is part of the "Big Woods" hardwood forests in central Minnesota. This is a subsection of the Ecological Classification System developed by the Minnesota Department of National Resources and the United States Forest Service. The landscape is distinguished by "circular, level topped hills bounded by smooth side slopes. Broad level areas between the hills are interspersed with closed depressions containing lakes and peat bogs." [13]

While the landform has remained the same over time, the vegetation and land use have been altered significantly over time. With the exception of areas south of the Project along the Minnesota River, the majority of the area has been developed for residential and commercial use, with only small portions of forest or wetlands remaining. However, several segments of the proposed alignment cross or pass by water, including Bluff Creek and Assumption Creek in Carver County and Purgatory Creek in Hennepin County. The Project also runs close to Strunk Lake, Harrison Lake, College Lake, Mud Lake, Galpin Lake, Lake Minnetonka, William Lake, Duck Lake, and other water features.

[13] For more information on this subsection, see http://www.dnr.state.mn.us/ecs/222Mb/index.html.

Figure 2. Factors Considered by the Commission in Issuing a Route

7850.4100 FACTORS CONSIDERED.

In determining whether to issue a permit for a large electric power generating plant or a high voltage transmission line, the commission shall consider the following:

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

B. effects on public health and safety;

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

D. effects on archaeological and historic resources;

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

F. effects on rare and unique natural resources;

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

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

I. use of existing large electric power generating plant sites;

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

K. electrical system reliability;

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

M. adverse human and natural environmental effects which cannot be avoided; and

N. irreversible and irretrievable commitments of resources.

Statutory Authority: *MS s 116C.66; 216E.16*

History: *27 SR 1295; L 2005 c 97 art 3 s 19*

Posted: *September 18, 2009*

5.2 Socioeconomic

According to U.S. Census Bureau American Community Survey data, only one city in the area, Eden Prairie, has a minority population exceeding the state percentage. However the city has a smaller percentage than Hennepin County as a whole. The cities in the area, excluding Chaska and Excelsior, have significantly higher per capita income (PCI) than the state or county PCI. All the cities in the area have lower poverty rates than the state as a whole. The data in **Table 5** below suggest the proposed route does not contain disproportionately high minority populations or low-income populations.

Table 5. Population and Economic Profile, 2010[14]

Location	Population	Minority[15] Population (Percent)	Per Capita Income	Individuals Below Poverty Level (Percent)
State of Minnesota	5,303,925	16.9	$29,431	10.9
Carver County	91,042	9.3	$35,987	5.0
City of Chanhassen	22,952	8.2	$43,571	2.9
City of Chaska	23,770	16.6	$33,358	8.4
Hennepin County	1,152,425	28.3	$35,687	11.9
City of Eden Prairie	60,797	20.0	$48,916	5.0
City of Shorewood	7,307	5.4	$58,789	1.1
City of Excelsior	2,393	5.9	$29,127	5.7
City of Greenwood	729	3.4	$63,200	0.8
City of Deephaven	3,853	2.6	$58,544	2.6
City of Minnetonka	49,734	11.4	$47,036	4.2
Scott County	129,928	15.5	$33,750	4.8

[14] U.S. Census Bureau, American Community Survey 5-Year (2006-2010) Summary File
[15] Minority population includes all persons excluding non-Hispanic white.

Economic Impacts

Approximately 8 to 12 workers would be required for construction of the transmission line. The transmission crews are expected to spend approximately six months constructing the project. Xcel Energy does not anticipate that additional permanent jobs would be created by the project.

The construction activities may provide a small influx of economic activity into the communities during the construction phase, and materials such as concrete may be purchased from local vendors. Long-term beneficial impacts from the project include increased local tax base resulting from the incremental increase in revenues from utility property taxes. Indirect impact may occur through the increased capability of the applicant to supply energy to commercial and industrial users, which would contribute to the economic growth of the region.

Property Values

One of the first concerns of many residents near existing or proposed transmission lines is how that proximity could affect the value of their property. Because property values are influenced by a complex interaction between factors specific to each individual piece of real estate as well as local and national market conditions, the effect of one particular project on the value of one particular property is difficult to determine.

In the Final Environmental Impact Statement on the Arrowhead-Weston Electric Transmission Line Project, the Wisconsin Public Service Commission addressed the issue of property value changes associated with high voltage transmission lines[16]. This document looked at approximately 30 papers, articles and court cases covering the period from 1987 through 1999.

> *In general there are two types of property value impacts that can be experienced by property owners affected by a new transmission line. The first is a potential economic impact associated with the amount paid by a utility for a right-of-way (ROW) easement. The second is the potential economic impact involving the future marketability of the property.*
>
> *However, substantial differences may exist between people's perceptions about how they would behave and their actual behavior when confronted with the purchase of property supporting a power line.*
>
> *The presence of a power line may not affect some individual's perceptions of a property's value at all. These people tend to view power lines as necessary infrastructure on the landscape, similar to roads, water towers and antenna. They generally do not notice the lines nor do they have strong feelings about them.*

[16] Final Environmental Impact Statement , Arrowhead –Weston Electric Transmission Line Project, Volume I, Public Service Commission of Wisconsin Docket 05-CE-113, October 2000, pg 212-215

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

- The potential reduction in sale price for single family homes may range from zero to 14 per cent.
- Adverse effects on the sale price of smaller properties could be greater than effects on the sale price of larger properties.
- Other amenities, such as proximity to schools or jobs, lot size, square footage of a house and neighborhood characteristics, tend to have a much greater effect on sale price than the presence of a power line.
- The adverse effects appear to diminish over time.
- Effects on sale price are most often observed for property crossed by or immediately adjacent to a power line, but effects have also been observed for properties farther away from the line.
- The value of agricultural property is likely to decrease if the power line poles are placed in an area that inhibits farm operations.

Later, the Final EIS stated, "In coastal states, such as California and Florida, the decrease in property values can be quite dramatic; in states within the Midwest (Minnesota, Wisconsin and the Upper Peninsula of Michigan), the average decrease appears to be between 4 and 7 percent."

Although studies have not been able to provide a basis for accurately predicting the effect of a particular transmission line on a particular property, researchers have attributed the effects of HVTLs on property values to an interaction between five factors:

- Proximity to the transmission towers and lines
- The view of the towers and lines
- Size and type of HVTL structures
- Appearance of easement landscaping
- Surrounding topography[17]

A possible concern associated with transmission lines includes potential effects on mortgage loans insured by the Federal Housing Administration (FHA), as well as the availability of Housing and Urban Development (HUD) backed mortgages for development of high density residential or mixed use developments. FHA guidelines, as specified in the Housing and Urban Development Handbook, prohibit mortgage support for homes in the easement within the fall zone (tower height) of high voltage transmission (60 kV or above) towers. (HUD, 2009). For single family and multi-family homes, the eligibility standards to qualify for an FHA-insured mortgage were recently clarified in a fact sheet issued by FHA (November 2010). This fact sheet states that a *living unit located outside the easement* of a high voltage transmission line *is eligible for FHA financing*.

[17] Pitts, Jennifer M. and Thomas O. Jackson. 2007. "Power Lines and Property Values Revisited." *The Appraisal Journal. Fall, 2007.*

FHA does require appraisers to review properties under consideration for FHA loans for presence of utility easements. The US Department of Housing and Economic Development has provided the following guidance:

- *The appraiser must indicate whether the dwelling or related property improvements is located within the easement serving a high-voltage transmission line, radio/TV transmission tower, cell phone tower, microwave relay dish or tower, or satellite dish (radio, TV cable, etc).*
- *If the dwelling or related property improvement is located within such an easement, the DE Underwriter must obtain a letter from the owner or operator of the tower indicating that the dwelling and its related property improvements are not located within the tower's (engineered) fall distance in order to waive this requirement.*
- *If the dwelling and related property improvements are located outside the easement, the property is considered eligible and no further action is necessary. The appraiser, however, is instructed to note and comment on the effect on marketability resulting from the proximity to such site hazards and nuisances*.[18]

Potential Impacts and Mitigations

Socioeconomic impacts resulting from the project would be primarily positive. Mitigative measures are not necessary. In the matter of property values, potential impact would typically be a negotiated settlement in an easement agreement between the Applicant and the landowner. In this case, the incremental differences between properties with the existing 69 kV and the same properties with the proposed 115 kV HVTL would be difficult to discern.

5.3 Displacement

The proposed project maximizes the use of an existing transmission line route – the proposed upgrade anticipates using existing transmission rights-of-way for its entire length. Because no new right-of-way acquisition is anticipated, no homes or businesses would need to be removed to upgrade the transmission line. There are a small number of residences and commercial structures that have encroached on the existing ROW, however Xcel Energy does not anticipate those structures would fail NESC safety codes.

Potential Impacts and Mitigations

Displacement of residential homes or businesses is not anticipated. However, it can be noted that the residences within the existing ROW could be impacted by the FHA issues discussed above, if the residence itself actually is within the "fall zone" of a structure. It may be possible for the Permittee to work with landowners to discuss advantageous placement of the new poles.

[18] U.S. Department of Housing and Urban Development. "*Is a Property eligible for FHA if there are overhead or high voltage power lines nearby?"*
http://portalapps.hud.gov/FHAFAQ/controllerServlet?method=showPopup&faqId=1-6KT-2009

5.4 Anticipated Noise Impacts

Noise is measured in units of decibels ("dB") on a logarithmic scale. The A weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. For example, a noise level change of 3 dBA is barely perceptible to average human hearing while a 10 dBA change in noise level is perceived as doubling the loudness. Two sources of noise would be associated with the completed Project: conductors and substations.

Land use activities associated with residential, commercial, and industrial land are grouped together into Noise Area Classifications (NAC). Residences, which are typically considered sensitive to noise, are classified as NAC 1. Each NAC is assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) noise limits for land use activities within the NAC. **Table 6** shows the Minnesota Pollution Control Agency (MPCA) daytime and nighttime limits in dBA for each NAC as established in Minn. Rule 7030.0040, subp. 2. The limits are expressed as a range of permissible dBA within a 1-hour period; L50 is the dBA that may be exceeded 50 percent of the time within an hour, while L10 is the dBA that may be exceeded 10 percent of the time within one hour.

Table 6. MPCA Daytime and Nighttime Noise Limits

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

Typical noise sensitive receptors along the route would include residences, businesses and schools. Typical ambient noise levels of 50 to 60 dBA would be expected near roadways, urban areas and commercial and industrial properties. Conductor and substation noise would comply with state noise standards.

Noise issues associated with the Project may be related to both the construction and operation of the transmission system. Construction noise is expected to occur during daytime hours as the result of heavy equipment operation and increased vehicle traffic associated with the transport of construction personnel to and from the work area. Any exceedences of the MPCA daytime noise limits would be temporary in nature and no exceedences of the MPCA nighttime noise limits are expected for this project.

Noise associated with the transmission conductors may produce audible noise under certain operational conditions. The level of noise depends on conductor conditions, voltage level and weather conditions. Noise emission from a transmission line occurs during heavy rain and wet conductor conditions. In foggy, damp or rainy weather conditions, transmission lines can create a subtle crackling sound due to the small amount of electricity ionizing the moist air near the

wires. During heavy rain, the general background noise level is usually greater than the noise from a transmission line, and few people are in close proximity to the transmission line in these conditions. For these reasons, audible noise is not noticeable during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, the proposed transmission lines may produce audible noise. During dry weather, audible noise from transmission lines is an imperceptible, sporadic crackling sound.

However, noise levels produced by a 115 kV transmission line are generally less than outdoor background levels and are therefore not usually audible. Computer software produced by the Bonneville Power Administration (BPA) was employed by Xcel Energy to model the expected noise level based on the proposed structures and conductors. **Table 7** below measures expected noise under the worst case wet conditions scenario at the edge of a 75-foot-wide right-of-way (37.5 feet from the centerline).

Table 7. Predicted Audible Noise from the Proposed Project

Structure Type	A-weighted Decibels at 37.5 ft. from Centerline (at One Meter Above the Ground)	
	L_5	L_{50}
Horizontal Post 115 kV Steel Pole Single-circuit	22.2	18.7
Y-Frame or H-Frame 115 kV Steel Pole Single-circuit	17.9	14.4
Braced Post 115 kV Steel Pole Single-circuit With 13.8 kV Distribution Underbuild	22.7	20.7
Davit Arm 115 kV/115 kV Steel Pole Double-circuit	20.1	16.6

The most significant noise associated with the operation of transmission facilities is transformer "hum" at substations. The Applicant have stated that the substations will be designed and constructed to comply with MPCA state noise standards.

The nearest occupied home to the Deephaven Substation is located approximately 300 feet to the southeast. The nearest non-residential structure to the Deephaven Substation is the Deephaven Elementary School which is located approximately 210 feet to the west. The new transformer specifications requested for this substation design will result in a quieter transformer than what exists today. See **Figure 3.**

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

Figure 3. Noise at Deephaven Substation Nearest Receptors

Deephaven Substation Sound Levels

Scenario 1- TR#1 +TR#2 = 71.9 dBA (Existing-Measured)

Scenario 2- TR#1- 68 dBA+ TR#2- 68 dBA (Future-Measured)

Receptor	Receptor Distance from Transformer	Noise Area Classification	Daytime L50 Standard	Nighttime L50 Standard	Scenario 1:Existing*	Scenario 2: Future
			Sound Level (dBA)	Sound Level (dBA)	Sound Level (dBA)	Sound Level (dBA)
Residence 1	370' ENE	NAC-1	60	50	40	41
Residence 2	460' ESE	NAC-1	60	50	38	39
Residence 3	300' SE	NAC-1	60	50	42	43
Residence 4	375' S	NAC-1	60	50	39	41
School	210' SW	NAC-2	65	65	42	44

* Estimations based upon sound levels monitored on substation property.

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

Potential Impacts and Mitigations

Noise levels produced by 115 kV transmission lines are usually not audible. Additionally, much of the project is located adjacent to roadways, and traffic noise would overpower any project-related noise emissions. Noise impacts from the transmission are not anticipated. The Applicant have stated that in an effort to mitigate noise levels associated with construction activities, work would be limited to daytime hours between 7 a.m. and 10 p.m. on weekdays. Occasionally there may be construction outside of these hours or on a weekend if the company is required to work around customer schedules, line outages, or has been significantly impacted due to other factors. Heavy equipment would also be equipped with sound attenuation devices such as mufflers to minimize the daytime noise levels.

As to transformer noise, some noise baffling options such as sound walls are possible to shield noise from receptors that are especially close to a substation. However, modeling shows substation noise would not exceed MPCA standards.

5.5 Radio and Television Interference

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

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

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

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

- corona generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 megahertz (MHz)), and

- the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

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

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

Due to the higher frequencies of the TV broadcast signal (54 MHz and above), 115 kV transmission lines seldom result in reception problems within a station's primary coverage area. The proposed transmission line would rarely cause TV interference within a broadcast station's primary coverage area where good reception is presently obtained. Usually any reception problem can be corrected with the addition of an outside antenna.

Potential Impacts and Mitigations

No interference issues are anticipated with this project. However, should such interferences be identified, they can usually be resolved by repairing loose or damaged transmission facilities. The Applicant would be required to resolve problems caused by the Project as a condition of the HVTL Route Permit.

5.6 Aesthetics

Because the proposed Project would follow an existing 69 kV transmission line route, it would have nominal, incremental effects on the visual and aesthetic character of the area. (There would be no construction or change in Segment 1 and therefore no change in aesthetic impact for that segment.) The proposed structures for the new 115 kV lines (see **Table 3**) would be about 60 to 90 feet tall generally, with 200 to 400 feet spans for post structures and 400 to 900 feet for H-frame and Y-frame structures. This spacing is appropriate to keep the conductor within existing right-of-ways. Poles would be 70-110 feet for areas where the single-circuit 115 kV transmission would have the distribution line built underneath on the same pole. Generally, the proposed structures would be slightly taller than the existing poles; however the overall spacing of the poles is intended to be comparable to the current layout, which varies somewhat due to engineering and land use constraints. The finish of the proposed poles would be either galvanized steel or self-weathering steel. The existing transmission line structures in this area are a variety of wood and steel poles, and some of the existing poles are H-frame construction.

Figure 4. Comparative View of New Structures

The existing line is on the left. A simulation of the proposed line is on the right.

Like the existing 69 kV transmission line, the new 115 kV transmission line will be visible to area residents. The visual effect will depend largely on the perceptions of the observer. The transmission and substations that already exist in the project area will limit the degree to which the new installations can be viewed as a disruption to the area's scenic integrity. As an example, **Figure 4** above compares a computer simulation (right) of the proposed line to a section of the existing line (left) in Greenwood near St. Albans Bay.

Potential Impacts and Mitigations

Although the transmission line would be visible throughout most of its length, it would be only incrementally different from the existing transmission line that currently runs along the public transportation corridors and residential and commercial development in the area. Mitigation could include specific vegetation planning for high visibility areas, e.g., along Lake Minnetonka.

A potential mitigation for the aesthetic impact of transmission lines would be to underground the line. This is not a practical solution for the project as a whole, as it would create a financially impractical system alternative. For example, an overhead 115 kV transmission line constructed with single pole structures spaced 300 to 400 feet apart costs approximately $350,000 - $500,000 per mile. The same facility placed underground could cost up to seven to 10 times as much.[19]

In very specific instances, undergrounding may be considered as mitigation. For example, the city of Greenwood asked for information on undergrounding the line along the LRT Regional Trail starting at Linwood Circle at the east end of Greenwood and continuing to just short of the St. Alban's Bay bridge at the west end of Greenwood. The segment is 1.1 miles long. The city had expressed concern over impacts to "aesthetics, recreation, and tourism." Xcel Energy has provided an estimate of $7 million to underground this segment, compared to an overhead cost of $1 million.

5.7 Public Health and Safety, including EMF

Proper safeguards would need to be implemented for construction and operation of the facility. The project would be designed to comply with local, state, NESC and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials and ROW widths. Xcel Energy construction crews and contract crews would comply with local, state, NESC and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures would be followed during and after installation of the transmission line. This would include clear signage during all construction activities. The transmission line would be equipped with protective devices to safeguard the public from the transmission line if an accident occurs and a structure or conductor falls to the ground. The protective devices are breakers and relays located where the transmission line connects to the substation. The protective equipment would de-energize the transmission line, should such an event occur. In addition, the substation facilities would be fenced and access limited to authorized personnel.

[19] See CNA at 50-51

Electric and Magnetic Fields

Voltage transmitted through any conductor produces both an electric field and a magnetic field in the area surrounding the wire. The electric field associated with HVTLs extends from the energized conductors to other nearby objects. The magnetic field associated with HVTLs surrounds the conductor. Together, these fields are generally referred to as electromagnetic fields, or EMF. These effects decrease rapidly as the distance from the conductor increases.

Electric Fields

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

The intensity of electric fields is associated with the voltage of the transmission line and is measured in kilovolts per meter (kV/M). Transmission line electric fields near ground are designated by the difference in voltage between two points (usually 1 meter). **Table 8** provides the electric fields at maximum conductor voltage for the proposed transmission lines. Maximum conductor voltage is defined as the nominal voltage plus five percent.

Table 8. Calculated Electric Fields (kV/m) at One Meter above Ground

Structure Type	Maximum Operating Voltage (kV)	Distance from Centerline (Feet)						
		-100	-50	-25	0	25	50	100
Proposed 115 kV Configuration								
Horizontal Post 115kV Steel Pole Single-circuit	121	0.04	0.15	0.39	1.13	0.51	0.15	0.05
H or Y Frame 115kV Steel Pole Single-circuit	121	0.09	0.52	1.48	0.68	1.48	0.52	0.09
Braced Post 115kV Steel Pole Single-circuit with 13.8kV Distribution Underbuild	121/15	0.05	0.12	0.20	0.18	0.20	0.15	0.05
Segment 1: 115/115 kV Existing Double-circuit	121	0.04	0.15	0.69	1.14	0.69	0.15	0.04

Structure Type	Maximum Operating Voltage (kV)	Distance from Centerline (Feet)						
		-100	-50	-25	0	25	50	100
Existing 69 kV Configuration								
Horizontal Post 115kV Steel Pole Single-circuit	72	0.025	0.092	0.233	0.674	0.305	0.091	0.029
H or Y Frame 115kV Steel Pole Single-circuit	72	0.051	0.308	0.876	0.406	0.880	0.310	0.052
Braced Post 115kV Steel Pole Single-circuit with 13.8kV Distribution Underbuild	72/15	0.033	0.070	0.108	0.120	0.119	0.085	0.031
Segment 1: 115/115 kV Existing Double-circuit	121/72	0.033	0.096	0.462	0.939	0.653	0.146	0.036

There is no federal standard for transmission line electric fields. In Minnesota, however, the Commission imposes a condition with a maximum limit of 8 kV/m in all HVTL permits. The Commission standard was designed to prevent serious hazard from shocks when touching large objects parked under high voltage transmission lines of 345 kV or greater. The maximum electric field associated with this project, measured at one meter above ground, would be 1.48 kV/m at 25 feet from a single-circuit H or Y Frame 115kV line.

Magnetic Fields

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

The magnetic fields for the proposed transmission lines structure and conductor configurations being considered for the project are shown below in **Table 9.** Magnetic fields were calculated for each section of the Project, since each would have a unique flow. The fields represent peak and average current flows as projected for the year 2025 under normal conditions. The magnetic field values are calculated for a point directly under the transmission line where the conductor is closest to the ground. The same method is used to calculate the magnetic field at the edge of the right-of-way. As is evident in the table, magnetic field levels decrease rapidly as the distance from the centerline increases (inversely proportional to the square of the distance from the line).

Table 9. Calculated Magnetic Flux Density (milligauss)

Segment	System Condition	Current (Amps)	Distance from Centerline (Feet)						
			-100	-50	-25	0	25	50	100
Proposed 115 kV Configuration									
Westgate to Deephaven 115 kV Single-circuit (Segments 7-10)	Peak	296	2.60	7.68	17.19	32.82	18.21	7.39	2.10
	Average	178	1.56	4.62	10.34	19.73	10.95	4.45	1.26
Deephaven to Excelsior 115 kV Single-circuit (Segments 5-6)	Peak	71	0.62	1.84	4.12	7.87	4.37	1.77	0.50
	Average	43	0.38	1.12	2.50	4.77	2.64	1.07	0.31
Excelsior to Scott County 115 kV Single-circuit (Segments 2-4)	Peak	31	0.27	0.43	1.80	3.44	1.91	0.77	0.22
	Average	19	0.17	0.49	1.10	2.11	1.17	0.47	0.13
Excelsior to Scott County 115/115 kV Double-circuit (Segment 1)	Peak	31	0.71	1.83	3.08	3.87	3.00	1.81	0.72
	Average	19	0.44	1.12	1.89	2.37	1.84	1.11	0.44
Braced Post 115 kV Steel Pole Single-circuit 13.8 kV Distribution Underbuild*	Peak	296/25	2.03	5.64	9.67	12.48	10.18	6.12	2.46
	Average	178/15	1.22	3.39	5.81	7.51	6.12	3.68	1.48
Existing 69 kV Configuration									
Westgate to Deephaven 69 kV Single-circuit (Segments 7-10)	Peak	305	2.69	7.95	17.79	33.94	18.85	7.65	2.17
	Average	183	1.61	4.77	10.67	20.37	11.31	4.59	1.30
Deephaven to Excelsior 69 kV Single-circuit (Segments 5-6)	Peak	105	0.93	2.74	6.12	11.69	6.49	2.63	0.75
	Average	63	0.56	1.64	3.67	7.01	3.89	1.58	0.45
Excelsior to Scott County 69 kV Single-circuit (Segments 2-4)	Peak	189	1.67	4.92	11.02	21.03	11.68	4.74	1.35
	Average	113	1.00	2.94	6.59	12.58	6.98	2.83	0.81
Excelsior to Scott County 69/115 kV Double-circuit (Segment 1)	Peak	250/189	4.94	12.50	21.02	27.54	22.20	13.32	5.23
	Average	150/113	2.96	7.49	12.59	16.50	13.31	7.98	3.13
Braced Post 69 kV Steel Pole Single-circuit 13.8 kV Distribution Underbuild*	Peak	305/25	2.10	5.82	9.98	12.89	10.50	6.31	2.54
	Average	183/15	1.26	3.49	5.99	7.73	6.30	3.79	1.52

** Sections with distribution underbuild are located throughout the various segments*

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

Table 10. Magnetic Fields (milligauss) From Common Home and Business Appliances[20]

Source	Distance from Source			
	.5 foot	1 foot	2 feet	4 feet
Baby Monitor	6	1	-	-
Computer Displays	14	5	2	-
Fluorescent Lights	40	6	2	-
Copy Machines	90	20	7	1
Microwave Ovens	200	4	10	2
Electric Pencil Sharpeners	200	70	20	2
Vacuum Cleaner	300	60	10	1
Can Opener	600	150	20	2
Color Televisions	NA	7	2	-

Stray Voltage

Stray voltage encompasses two phenomena: Neutral to Earth Voltage and Induced Voltage. In general, stray voltage describes any case of elevated potential, but more precise terminology gives an indication of the source of the voltage.

Neutral to Earth Voltage (NEV) refers to a condition that can occur at the electric service entrances to structures, that is, where distribution lines enter structures. It is the phenomena most commonly referred to as "stray voltage." NEV is an extraneous voltage that appears on metal surfaces in buildings, barns and other structures, which are grounded to earth. NEV can be experienced, for example, by livestock who simultaneously come into contact with two metal objects (e.g., feeders, waterers, stalls). If there is a voltage between these objects, a small current will flow through the livestock. The fact that both objects are grounded to the same place (earth) would seem to prevent any voltage from existing between the objects. However, this is not the case – a number of factors determine whether an object is, in fact, grounded. These include wire size and length, the quality of connections, the number and resistance of ground rods, and the current being grounded.[21]

[20] National Institutes of Health. National Institute of Environmental Health Sciences (NIEHS). 2002. *EMF Electric and Magnetic Fields Associated with the use of Electrical Power.*
[21] Stray Voltage, NDSU Extension Publication #108, http://www.ag.ndsu.edu/extension-aben/epq/files/epq108.pdf.

Neutral to Earth Voltage can result from damaged, corroded or poorly connected wiring or damaged insulation. Thus, NEV can exist at any business, house or farm which uses electricity, independent of whether there is a transmission line nearby. NEV is largely an issue associated with electrical distribution lines and electrical service at a residence or on a farm. Transmission lines do not create NEV as they do not directly connect to businesses, residences or farms.

NEV can be reduced in three ways: reducing the current flow on the neutral wire entering a home or building, reducing the resistance of the neutral system, or improving the grounding of the neutral system. Making good electrical connections and making sure that these connections have the proper wiring materials for wet and corrosive locations will reduce the resistance of grounded neutral system and thereby reduce NEV levels.

Induced Voltage refers to situations where an electric field extends to a nearby conductive object, thereby "inducing" a voltage on the object. The electric field from a transmission line in some instances can reach a nearby conductive object, such as a vehicle or a metal fence, which is in close proximity to the transmission line. This may induce a voltage on the object, which is dependent on many factors, including the weather conditions, object shape, size, orientation, capacitance and location along the right-of-way. If these objects are insulated or semi-insulated from the ground and a person touches them, a small current would pass through the person's body to the ground. This touch may be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person.

The major concern with induced voltage is the current that flows through a person to the ground when touching the object, not the level of the induced voltage. Most shocks from induced current are considered more of a nuisance than a danger, but to ensure the safety of persons in the proximity of high-voltage transmission lines, the NESC requires that any discharge be less than 5 milliAmperes. In addition, the Commission's electric field limit of 8 kV/m was designed to prevent serious hazard from shocks due to induced voltage under high-voltage transmission lines. Proper grounding of metal objects under and adjacent to the transmission line is the best method of avoiding these shocks.

While transmission lines do not, by themselves, create NEV because they do not connect to businesses or residences, they can induce voltage on a distribution circuit that is parallel and immediately under the transmission line. This induced voltage only occurs in the immediate vicinity of the distribution circuit; it does not travel along the transmission or distribution line. Standard industrial designs can mitigate potential for stray voltage to impact distribution lines.

Induced voltage can be reduced or eliminated using cancellation, separation or enhanced grounding. Cancellation can be achieved by configuring the conductors of the transmission line to minimize EMF levels. Separation literally increases the distance between the transmission and distribution lines by physically placing the lines in different locations or by increasing the vertical distance between transmission and distribution lines collocated on the same poles. Enhanced grounding connects counterpoises to the distribution neutral wire and the transmission shield wire.

Potential Impacts and Mitigations

The effect of EMF on human health has been the subject of study for over 25 years. Of particular concern is the link between EMF exposure and cancer. Numerous panels of experts have convened to review research data on whether EMF is associated with adverse health effects. Studies have been conducted by the National Institute of Environmental Health Sciences (NIEHS), the USEPA, the World Health Organization (WHO), and the Minnesota State Interagency Working Group (MSIWG) on EMF issues.

Potential Impacts

Studies regarding EMF exposure and childhood leukemia and other cancer risks have had mixed results. Some organizations have determined that a link between EMF and cancer exists while others have found this link to be weak or nonexistent.

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

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

- The scientific evidence suggesting that [extremely low frequency] ELF-EMF exposures pose any health risk is weak.

- Epidemiological studies have serious limitations in their ability to demonstrate a cause and effect relationship whereas laboratory studies, by design, can clearly show that cause and effect are possible. Virtually all of the laboratory evidence in animals and humans and most of the mechanistic work done in cells fail to support a causal relationship between exposure to ELF-EMF at environmental levels and changes in biological function or disease status. The lack of consistent positive findings in animals or mechanistic studies weakens the belief that this association is actually due to ELF-EMFs, but it cannot completely discount the epidemiological findings.

- The NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern (NIEHS, 1999).

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

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

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

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

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

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

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

- Some epidemiological results do show a weak but consistent association between childhood leukemia and increasing exposure to EMF (see the conclusion of IARC and NIEHS). However, epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and the association must be supported by data from laboratory studies. Existing laboratory studies have not substantiated this relationship (see NTP, 1999; Takebe et al., 2001), nor have scientists been able to understand the biological mechanism of how EMF could cause adverse effects. In addition, epidemiological studies of various other diseases, in both children and adults, have failed to show any consistent pattern of harm from EMF.

- The Minnesota Department of Health concludes that the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects. However, as with many other environmental health issues, the possibility of a health risk from EMF cannot be dismissed. Construction of new generation and transmission facilities to meet increasing electrical needs in the State is likely to increase exposure to EMF and public concern regarding potential adverse health effects.

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

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

EMF as it relates to public health and safety continues to be researched and reviewed.

Potential Mitigations

There are no federal or Minnesota state regulations for the permitted strength of a magnetic field on a transmission line; however both Florida and New York have standards ranging from 150 to 250 mG. **Table 11** summarizes current international and state guidelines for EMF.

As the table above portrays, the calculated mG for the Project are a fraction of the existing standards. Still, as per the MDH White Paper recommendations concerning "prudent avoidance," utilities routinely provide information on the issue to the public, interested customers and employees. This information contains references to studies and provides data to help explain the relative impact of transmission line exposure to other EMF exposures most people experience throughout the day at home or at work. Xcel Energy also provides measurements for landowners, customers and employees who request them. In addition, Xcel Energy stated in its application that it would use structure designs that minimize magnetic field levels and, where practicable, site facilities in locations affecting the fewest number of people.

For stray voltage, concerns have been raised on some dairy farms because it can impact operations and milk production. Problems are usually related to the distribution and service lines directly serving the farm or the wiring on a farm. In those instances when transmission lines have been shown to contribute to stray voltage, it was found that the electric distribution system directly serving the farm or the facilities themselves were directly under and parallel to the transmission line. These circumstances are considered in modern day routing/installing of transmission lines and can be readily avoided.

Table 11. ELF EMF International and State Guidelines

ELF-EMF Guidelines Established by Health & Safety Organizations		
Organization		**Magnetic Field**
American Conference of Governmental and Industrial Hygienists (ACGIH) (Occupational)		10,000 mG (for general worker) 1,000 mG (for workers with cardiac pacemakers)
International Commission on Non-Ionizing Radiation Protection (ICNIRP) (General Public, Continuous Exposure)		2000 mG
Non-Ionizing Radiation Committee of the American Industrial Hygiene Association		4,170 mG
Institute of Electrical and Electronics Engineers (IEEE) Standard C95.6 (General Public, Continuous Exposure)		9,040 mG
U.K., National Radiological Protection Board (NRPB)		833 mG
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)		3,000 mG
State Standards and Guidelines		
State	**Line Voltage**	**Magnetic Field (Edge of ROW)**
Florida	69-230 kV	150 mG
	230-500 kV	200 mG
	>500 mG	250 mG
Massachusetts		85 mG
New York		200 mG

5.8 Recreation

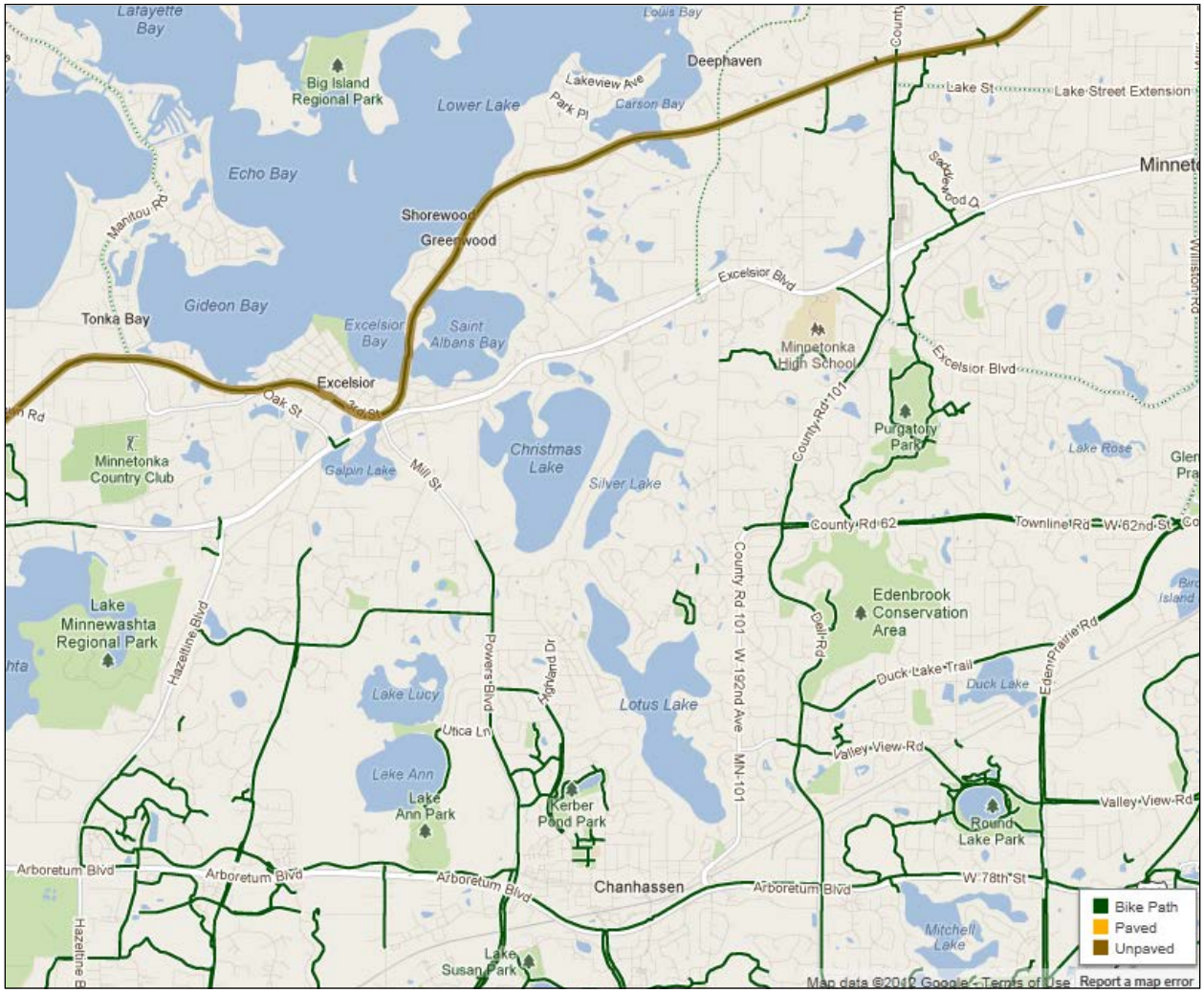
The 200-foot-wide proposed Project intersects or abuts a total of 13 parks and preserves. The parks are Bluff Creek in Chaska, Lake Minnewashta Regional Park in Chanhassen, Pinehurst Preserve at Lake Harrison in Chanhassen, Bluff Creek Preserve in Chanhassen, Village Hall Park in Deephaven, Burton Park in Deephaven, Purgatory Park in Minnetonka, Kelly Park in Minnetonka, Edenbrook Conservation Area in Eden Prairie, Round Lake Park in Eden Prairie, Edenvale Conservation Area in Eden Prairie, Edenvale Park in Eden Prairie, and the Minnesota Valley State Recreational Area in Carver and Scott Counties. Relative impacts of alternative route segments on parks are charted out in Section 6.

The Minnesota Valley State Recreational Area is along the southern area of the Project, along Segment 1, which will not experience any construction. Since the transmission line already coexists with all these recreational resources, the Project is not expected to add additional impacts to any of them.

A major recreational resource in the area is the Lake Minnetonka LRT Regional Trail, a10-foot wide crushed limestone biking, walking and running trail. The trail includes wooden bridges and several road crossings. The corridors were acquired by the Hennepin County Regional Railroad Authority (HCRRA) for future light rail transit use. A cooperative agreement between HCRRA and Three Rivers Park District allows the corridors to be used for interim recreational purposes. Three Rivers Park District operates the trail during the spring, summer and fall seasons. Certain municipalities permit winter trail activities. The Metropolitan Council estimates 410,000 users of the trail annually.[22]

In all, 28 bikeways intersect the Project Area along its length. (In **Figure 5** below, the brown line represents the LRT.)

Figure 5. Bike Paths and Recreation Areas near Proposed Rebuild



Three Rivers Parks District (http://www.threeriversparks.org/trail-map.aspx?t=lake-minnetonka-trail)

[22] Three Rivers Park District letter, November 16, 2012, eDockets no. 201211-80729-01

Potential Impacts and Mitigations

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

The HVTL will be visible from most of these areas, and the transmission along the LRT trail will be visible from Lake Minnetonka in many areas. However, direct impact to these resources is not expected. The transmission line as proposed would not impact any new areas not already affected by the existing transmission lines along designated public lands. However, Three Rivers Park District recommends a modified vegetation management plan be developed by Xcel Energy in collaboration with the HCRRA, Three Rivers Park District, and the affected cities through which the route passes.

5.9 Land-based Economies

Agriculture

Most of the agricultural land in the Project area is in Carver County along the existing double-circuit 115 kV/69 kV (Segment 1). Xcel Energy will use the existing structures and conductors and merely increase the voltage on the 69 kV circuit to run at 115 kV. Since there will be no construction in this area, there will be no impacts. Most of the remainder of the existing line runs through residential, commercial and some natural areas. Xcel Energy estimates construction activities associated with the Project will temporarily impact only 24 agricultural acres. This acreage comprises numerous, small agricultural properties distributed throughout the Project area.

Construction of new transmission structures and removal of existing structures will require repeated access to structure locations to install foundations, structures and conductors. Equipment used in this process includes drill rigs, concrete trucks, backhoes, cranes, boom trucks and assorted small vehicles.

Potential Impacts and mitigations

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

When possible, spring-time construction will be avoided. Construction mats may also be used to minimize impacts on the access paths and in construction areas. Xcel Energy has stated in its Application that construction teams will work with the property owner, right-of-way agent, and transmission line engineers to minimize the impact on property.

The Route Permit would require Xcel Energy to compensate landowners for any crop damage and soil compaction that occurs as a result of the Project.

Forestry

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

Potential Impacts and Mitigations

Because the route follows existing ROW for much of its length, clearing of trees would be minimal. Impacts to forested areas and shelterbelts along the rebuild portion of the route would be incidental, and would be limited to the amount necessary to permit safe and reliable operation of the transmission line. Due to safety concerns, any trees that would grow taller than 15 feet within the ROW would need to be removed beneath overhead lines. Additionally, a 10-foot radius around each structure would be kept free of woody vegetation.

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

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

Mining

According to the Minnesota Department of Transportation (Mn/DOT) county pit maps for Scott, Carver and Hennepin counties, there are gravel pits, rock quarries and commercial aggregate sources in the vicinity of the project.[23] Of these, the closest are three active pits located within one mile, but still outside the boundaries of the Project along Segment 1. As noted above, no construction is planned for this segment. There are no active gravel pits located within one mile of Segments 2 through 10. Unknown resources that may exist along the proposed route would likely be situated close to existing utility and road ROW, making development unlikely.

Potential Impacts and Mitigations

Since there are no mineral mining or "known but undeveloped resources" along or within the proposed Project area, the Project would have no potential impact on mineral mines. Additionally, since the Project is proposed to be rebuilt within the existing ROW, any potential aggregate resources in the ROW would have already been impacted in terms of their availability for development. Therefore, there would be no additional impacts on potential aggregate resources in the project area. Because no impacts are anticipated, no mitigation is required.

[23] See RPA at 76 for a map of Aggregate Resources near the Project area.

5.10 Commercial, Industrial, Residential Land Use

The Project area, especially in the rebuild portion of the line, is heavily populated (see **Table 5** and the Environmental Features Maps in **Appendix 2.2**). Land use in the project area is primarily a mixture of commercial and residential. **Table 12** displays the number of homes and businesses in the Project area in proximity to the existing line. In Segment 1, where no construction is planned, one residence in the Riverview Terrace Mobile Home Park is within three feet of a tower structure. Along the entire route, 11 homes (in Segments 1, 9 and 10) and one business (in Segment 5) are within 25 feet of the existing transmission line, meaning they would be located within the proposed ROW of the anticipated alignment as well.[24]

Table 12. Residences and Businesses in Proximity to Transmission Line[25]

	Residential Structures					**Commercial Operations**				
	Distance in Feet					Distance in Feet				
	0-25	26-50	51-100	101-200	**Total**	0-25	26-50	51-100	101-200	**Total**
Total[26]	11	69	176	311	**567**	1	9	15	29	**54**
1	5	8	24	43	**80**	0	0	3	2	**5**
2	0	4	8	18	**30**	0	4	1	5	**10**
3	0	3	19	46	**68**	0	0	1	1	**2**
4	0	2	5	8	**15**	0	1	1	4	**6**
5	0	3	15	35	**53**	1	3	4	4	**12**
6	0	0	4	12	**16**	0	0	1	2	**3**
7	0	2	12	18	**32**	0	0	0	0	**0**
8	0	1	24	33	**58**	0	0	3	8	**11**
9	2	36	49	57	**144**	0	0	1	0	**1**
10	4	10	16	41	**71**	0	1	0	3	**4**

[24] The impact on FHA financing for homes within an easement and within the fall zone of a transmission structure is discussed in Section 5.2 (Property Values).

[25] Xcel Energy provided the numbers for the table. They were derived by categorizing structures into "residential" and "commercial" using a combination of Google Street Maps and aerial photo interpretation.

[26] The structures counts have been recalculated for each distance, so those totals differ from Table 10 in the RPA. The combined totals (567 residences and 54 commercial operations) for the entire project have not changed.

Potential Impacts and Mitigations

The Applicant's preferred alignment minimizes new impacts to existing land uses by following existing transmission line ROW for its entire length. The existence of a transmission line easement does restrict some possible uses for the property. Acceptable uses within the easement areas include planting crops, pasture, roadways, curbs and gutters. The two most common restrictions would include prohibiting construction of permanent structures or buildings within the easement area and restrictions on planting trees that may grow into the lines; properties with existing structures very close to or within the current ROW may have further restrictions placed on them.

The project would be designed to meet or exceed the clearance standards provided in NESC Section 232 for a 115 kV transmission line, which require a 9'1'' horizontal distance between the conductor and a building; a 15'1'' vertical distance between the conductor and a roof/balcony accessible by people; and a 20'1'' vertical distance between the conductor and a roadway or parking lot. The proposed transmission lines would be equipped with protective devices to safeguard the public from the transmission line if an accident occurs, such as a structure or conductor falling to the ground.

In general, the rebuild portions (Segments 2-10) of the line would not create new impacts on existing or proposed land use; the Applicant anticipates using the same structure locations and line spans, therefore, no mitigation would be necessary for the majority of the proposed rebuild. Potential impacts to those properties with existing structures very close to or within the current ROW may be mitigated through final design efforts, such as using cantilever structures[27] to place the conductors on a single side of the towers away from a structure. Other mitigations may be adjustments of the final alignment within the route, and selection of span width and tower placement. For Segment 1, there is no planned change to the alignment and no planned construction, so there would be no new impacts.

Xcel Energy generally has stated in applications that it would work with county and city staff, business owners and residents to ensure that impacts to land use from the construction of the line are minimized and addressed.

5.11 Public Services and Transportation

There are eight cities in the Project area: Chanhassen and Chaska in Carver County and Eden Prairie, Shorewood, Excelsior, Greenwood, Deephaven and Minnetonka in Hennepin County. These municipalities provide water, sewer and electrical service to their residents. Based on comments provided by city staffs to Xcel Energy, no public utility or road improvement projects are currently planned for the areas near the existing transmission line within those municipalities. However, in a letter to EFP, Deephaven did mention it was replacing the bridge immediately adjacent the Deephaven Substation (see **Appendix C**).

[27] See RPA at 32

Regional transportation studies reveal no major projects or improvements near the proposed Project area. Mn/DOT did comment to EFP concerning potential impacts along trunk highway systems that could affect route alternatives (see Section 6 for specific comments). In general, Mn/DOT has adopted a formal policy and procedures for accommodation of utilities on highway rights-of-way (Utility Accommodation Policy).[28]

Potential Impacts and Mitigations

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

5.12 Archaeological and Historic Resources

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

A total of 679 previously recorded cultural resource properties (both archaeological and historic/architectural) were located within one mile of the proposed Project, 35 archaeological sites and 644 inventoried historic architectural properties.[29] Of the 35 archaeological sites, 16 consist of prehistoric artifacts scatters, six are single artifact finds, two are historical documentation records of abandoned townsites, seven are earthworks (which may or may not contain burials), two are cemeteries, one is an historic district containing ruins and artifacts, and one is a mill site. The historic district has a Considered Eligible Finding by the SHPO. The eligibility of the remaining inventoried archaeological sites is unevaluated.

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

Twenty-six of the 679 cultural resource properties identified are located within the 200-foot Proposed Route. Nineteen of those properties are located within the boundaries of the city of Excelsior and distributed along project Segments 4 and 5. Five are located in the city of Minnetonka along portions of Project Segment 8. Two are located within the city of Eden Prairie; one each in Segment 9 and 10. Only one of the 26 properties located within the 200-foot-wide area is considered eligible for listing on the National Register of Historic Places, a bridge on Minnetonka Boulevard that crosses the inlet of Lake Minnetonka.

[28] http://www.dot.state.mn.us/permits/utilityaccomodation.pdf (Revised November 2005)
[29] See RPA at Appendix F

Potential Impacts and Mitigation

The proposed Project should be able to avoid impacts to identified archaeological and historic architectural resources by rebuilding the line in place. Avoidance of archaeological and historic architectural properties is the preferred mitigative policy which Xcel Energy has stated it follows in all of its construction projects. Should a specific resource impact be identified, Xcel Energy is expected to consult with SHPO on whether the resource is eligible for listing in the NRHP.

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

There are no anticipated physical impacts to previously identified historic properties, and it is likely that physical impacts to any additional properties identified during SHPO recommended surveys can be avoided. New visual impacts to identified and unidentified historic architectural properties are not anticipated.

5.13 Natural Environment

Air Quality

There are minimal air quality impacts associated with transmission line construction and operation. The only potential air emissions from a transmission line result from corona. Corona can produce ozone and oxides of nitrogen in the air surrounding the conductor. Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors. For 115/115 kV double-circuit and 115 kV single-circuit transmission lines, the conductor gradient surface is usually below the air breakdown level.

Temporary fugitive dust emissions from construction activities may occur. Along the proposed route, clearing vegetation and driving the utility poles may create exposed areas susceptible to wind erosion. In addition, tailpipe emissions may generate exhaust from the construction vehicles. Fugitive dust is considered particulate matter under air quality regulations. The concentrations of fugitive dust that is fine particulate matter (PM less than 2.5 microns or PM2.5) is generally small, or approximately three percent to ten percent of total particulate matter (USEPA's AP-42, Sections 13.2 and 11.9). Since fine particulate matter has the potential to travel further into the lungs, it is of greater concern than larger particle size ranges.

Potential Impacts and Mitigation

Currently, both state and federal governments have regulations regarding permissible concentrations of ozone and oxides of nitrogen. The national standard is 0.08 ppm on an eight-hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year.

Calculations using the Bonneville Power Administration (BPA) Corona and Field Effects Program Version 3 (USDOE, BPA Undated) for a standard single-circuit 161 kV project, predicted the maximum concentration of 0.007 ppm near the conductor and 0.0003 ppm at one meter above ground during foul weather or worst-case conditions (rain at 4 inches per hour). During a mist rain (rain at 0.01 inch per hour), the maximum concentrations decreased to 0.0003 ppm near the conductor and 0.0001 ppm at one meter above ground level. For both cases, these calculations of ozone levels are well below the federal and state standards. Studies designed to monitor the production of ozone under transmission lines have generally been unable to detect any increase due to the transmission line facility. Given this, there would be no impacts relating to ozone for the project.

There would be limited emissions from vehicles and other construction equipment and fugitive dust from ROW clearing during construction of the transmission line and substation. Temporary air quality impacts caused by the construction-related emissions are expected to occur during this phase of activity. The magnitude of the construction emissions is influenced heavily by weather conditions and the specific construction activity occurring. Exhaust emissions from primarily diesel equipment would vary according to the phase of construction but would be minimal and temporary. Adverse impacts to the surrounding environment would be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

As a standard HVTL Permit condition, construction activities must follow best management practices (BMPs) to control air emissions (fugitive dust). Petroleum based dust suppressants may not be used. Construction vehicles with excess emissions would not be operated until repairs to the vehicle could be made. The disturbed area for each route would be minimized.

Water Quality

The Project area crosses the 100- and 500-year floodplains of the Minnesota River, Lower Lake Minnetonka, and two unnamed Public Water Wetlands. In addition, the Project area crosses the 100-year floodplain of Bluff Creek, Purgatory Creek, Carson's Bay of Lake Minnetonka and Duck Lake. The crossings occur in predominately residential neighborhoods and correspond to existing roadways with the exception of two locations; one in Segment 3 and one in Segment 8.

Various large wetland complexes and small isolated wetlands are located through the project area (see **Appendix A.2** for maps indicating wetlands locations), although a higher concentration of wetlands exists near the midsection of the proposed transmission route near the communities of Excelsior, Greenwood and Deephaven. Many of these wetlands are adjacent to the various lakes that lie in close proximity to the project. The National Wetlands Inventory (NWI) was reviewed to assess which wetlands may be present within the project area.

Eighty-eight separate wetlands were identified within the 200-foot-wide Project area, comprising 65 acres of wetlands. Of the wetlands present within the Project area, all but three are classified as Palustrine type wetlands. The other wetland types within the Project area are Lacustrine, which are associated with lakes, and Riverine, which are associated with rivers.

Of the Palustrine wetlands, the majority contain emergent vegetation, with some displaying a mixture of shrubs and herbaceous vegetation. Thirteen have open water components and contain unconsolidated bottoms. Lacustrine wetland systems are found in the shallow protected areas of lakes with water depth in the deepest part of the wetland basin greater than 6.6 feet. The areas intersected by the proposed route are at locations with existing roadways and do not appear to be as deep as 6.6 feet, but they are included as part of the same basin. The Riverine System includes all wetlands and deepwater habitats contained within a channel. The Riverine System is bounded on the landward side by upland, by the channel bank (including natural and man-made levees) or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

MnDNR Public Waters Inventory (PWI) identifies Public Wetlands, Waters and Watercourses. The Project Area intersects nine Public Wetlands, four Public Waters, and four Watercourses. There are four intersects with Bluff Creek, three with Purgatory Creek, one with Assumption Creek, and one with the Minnesota River at the beginning of Segment 1. The Public Wetlands and Waters are scattered across the length of the Project area. The Minnesota River and Assumption Creek intersects are within Segment 1, Bluff Creek intersects are within Segments 1, 2 and 3 and Purgatory Creek intersects are within Segments 8, 9 and 10.

Potential Impacts and Mitigation

Approximately 455 transmission structures would be required for the proposed construction, with an estimated 61 of these poles falling within wetlands. (There will be no physical construction, and therefore no wetland impacts in Segment 1.) MnDNR has recommended that the project design be adjusted to relocate poles outside of wetlands, floodplains and sensitive areas as much as possible, and recommends abandoned poles be removed completely or cut off at the base where appropriate.

Also, MnDNR expressed concerns about introduction of invasive species during construction.[30] In response, Xcel Energy spelled out a NWIs management plan in "Response 6" of its June 18, 2012 letter to MnDNR (see **Appendix C**). Xcel Energy additionally stated, "After the detailed design for Segments 2 through 10 has been completed, Xcel Energy will develop such a plan in coordination with MDNR and the government entities that own and manage road and trail rights-of-way along which parts of the re-built line will be co-located."

During construction, there is the possibility of sediment reaching surface waters as the ground is disturbed by excavation, grading and construction traffic. As a standard HVTL Permit condition, the Applicant would be required to employ erosion control BMP, as well as adherence to the terms and conditions of the National Pollution Discharge Elimination System (NPDES) and Stormwater Pollution Prevention Plan (SWPPP) permits required by MPCA. An NPDES permit is required for owners or operators for any construction activity disturbing 1) one acre or more of

[30] See http://www.dnr.state.mn.us/invasives/dnrlands.html for MnDNR information and flyers for working in public waters or on public lands.

soil; 2) less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre; or 3) less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources.

BMPs include maintaining sound water and soil conservation practices during construction and operation of the project to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored soil. Xcel Energy would be expected to avoid major disturbance of individual wetlands and drainage systems during construction. This would be done by spanning wetlands and drainage systems where possible. When it is not possible to span the wetland, Xcel Energy has stated that it would draw on several options during construction to minimize impacts:

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

The transmission line rebuild may require waters and wetlands permits, letters of no jurisdiction, or exemptions from the USCOE and MnDNR Division of Waters. After coordination and application submission, authorization from the USACE would likely fall under a Letter of Permission (LOP-05-MN) or the utility line discharge provision of a Regional General Permit (RGP-3-MN). The MnDNR Division of Waters requires a Public Waters Work Permit for any alteration of the course, current, or cross-section below the ordinary high water level of a Public Water or Watercourse. No such alterations are anticipated.

The cities of Chanhassen, Greenwood, Deephaven, Eden Prairie, Minnetonka, Chaska, and Minnehaha Creek Watershed District (MCWD), and Jackson Township (Scott County) are all LGU's that administer the WCA in the Project Area. It is possible that the BWSR representatives for Carver, Scott, and Hennepin Counties could coordinate with the LGU's so that one entity administers the WCA over the entire Project area. It is likely that wetland impact minimization will allow the project to be eligible for a WCA *de minimis* or utilities exemption. If that is not the case, WCA permits will be required.

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

Since the project proposes to replace an existing line with structures that have a similar footprint, the project should not result in any substantial, permanent wetland impacts or changes. Minimal

temporary impacts to wetlands may occur from construction activities and access to the line if these areas need to be crossed during construction of the transmission ROW. However, crossing wetlands during construction should be avoided to the greatest extent feasible.

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

Flora

Land cover in the Project area consists primarily of low to high intensity development including residential, light industrial, and roadways. The Project consists of improvements to existing infrastructure which is in place largely along existing roadways. Other significant land cover types within the Project Area are wetlands, deciduous forest, and developed open space with a small portion as cultivated cropland. Reed canary grass, cattail, cottonwood, sandbar willow, and sedges are the primary species in wetlands. Common species in forested areas include sugar maple, American elm, box elder, green ash, bur and red oak, and eastern cottonwood.

Potential Impacts and Mitigation

The majority of flora within habitats in the project area is typical of what will be found in these land covers. If the Project is built along the existing 69 kV transmission line ROW, no additional impacts are anticipated to native vegetation. Additionally, no new ROW would be cleared in forested areas along the rebuild portions, resulting in minimal impacts to this resource. Temporary impacts may occur due to activities associated with pole construction, including minor vegetative clearing for excavation, leveling and heavy equipment traffic. Vegetative clearing would include felling trees along the existing transmission line route, where encroachment would present a danger to safe operation, and temporarily trimming or removing any shrubs or tall grass. Similar to Xcel Energy's existing maintenance practices, trees that would grow to taller than 15 feet would be removed from beneath the overhead lines.

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

Fauna

The croplands, grasslands, wetlands, and woodlands in the area provide habitat for a variety of wildlife. Wildlife and other organisms that inhabit the Project Area include small mammals such as mice, voles, and ground squirrels; large mammals such as white-tailed deer; waterfowl and other water birds like pelicans and egrets, songbirds, raptors, upland game birds; and reptiles/amphibians such as frogs, salamanders, snakes, and turtles. (Xcel Energy has compiled an extensive list of local mammalian, avian, reptilian and amphibian species in their Route Permit Application in Appendix C.)

Potential Impacts and Mitigation

There is minimal potential for the displacement of wildlife and loss of habitat from construction of the project. Wildlife that inhabits natural areas such as meadows, rivers and lakes could be impacted in the short-term within the immediate area of construction. The distance that animals would be displaced would depend on the species. Impacts to wildlife are anticipated to be short-term since the route primarily would be constructed along an existing transmission line ROW, and the amount of grading and clearing required is minimal.

It is anticipated that fish and mollusks that inhabit the local watercourses will not be affected by transmission line rebuild or new line. Impacts to the wooded areas along the project route would benefit from the same vegetation management discussed in the above section on flora.

Raptors, waterfowl and other bird species may also be affected by the construction and placement of the transmission lines. Avian collisions are a possibility after the completion of the transmission line. Waterfowl are typically more susceptible to transmission line collision, especially if the line is placed between agricultural fields that serve as feeding areas, or between wetlands and open water which serve as resting areas. The electrocution of large birds, such as raptors, is more commonly associated with small distribution lines than large transmission lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Modern transmission line design provides adequate spacing to limit the risk of raptor electrocution and will minimize potential avian impacts of the proposed project.

Xcel Energy continues to work with various state and federal agencies, such as MnDNR and the U.S. Fish and Wildlife Service (USFWS), to address avian issues. In 2002, Xcel Energy's operating companies entered into a voluntary memorandum of understanding (MOU) with the USFWS to work together to address avian issues through its territory.

The project has been assessed for areas with potential avian issues. Areas where bird diverters might be warranted have been identified. Anticipated locations for those diverters, commonly referred to as Swan Flight Diverters (SFDs), are shown on the Environmental Features maps in **Appendix A.2** of this EA. In most cases, the shield wire of an overhead transmission line is the most difficult part of the structure for birds to see. Xcel Energy has successfully reduced collisions on certain transmission lines by marking the shield wires with SFDs, which are pre-formed spiral shaped devices made of polyvinyl chloride that wrap around the shield wire.

5.14 Rare and Unique Natural Resources

There are 65 known occurrences of rare or unique resources that have been identified within two miles of the Project area. These resources were identified using the MnDNR Natural Heritage Database. They include 26 occurrences of 14 vertebrate species, eight occurrences of five invertebrate species, 18 occurrences of 13 vascular plant species, one animal community, ten terrestrial communities, and two ecological features.

Twenty-five of the 65 records are located within 0.5 mile of the Project area and include the Bald eagle, Red-shouldered Hawk, Western Fox snake, Blanding's Turtle, Paddlefish, Shovelnose sturgeon, Rock pocketbook, Yellow sandshell, Marsh Arrow-grass, Sessile-flowered cress, Small White Lady's slipper, Sterile sedge, a bat concentration, a Seepage meadow/Carr, a Calcareous fen (Southern), one native plant community (undetermined class), and ice deposition (quaternary) (MnDNR, 2010). It should be noted that 42 of the 65 records are within two miles of Segment 1, a portion of the project where no structural changes or disturbance will occur as part of the Project.[31]

Potential Impacts and Mitigation

In general, impacts to rare and unique natural resources would be avoided because the project is a rebuild of an existing line within an existing utility corridor.

However, the environmental review process is designed to identify rare species and unique natural resources so that the various routing options can be designed to avoid encroachment and affects on these items to the greatest extent practicable. If through environmental review, rare species or unique natural resources are identified that will be affected, the HVTL Route Permit will require that Xcel Energy coordinate with the MnDNR and consider modifying either the construction footprint or the construction practices to minimize impacts.

For example, MnDNR has identified that Blanding's turtles have been reported in the vicinity of the proposed project and may be encountered on site. MnDNR has developed a fact sheet (see **Appendix B**) with information about the Blanding's turtle and BMPs. MnDNR also identified two state-listed fish that have been documented in Lake Minnetonka, the least darter and the pugnose shiner. They have recommended stringent erosion and sediment control practices for the area and a recommendation to span lakes crossed by the transmission line to help minimize impacts to these rare fish.

A field survey was completed by Xcel Energy in November of 2010 to search for previously unrecorded bald eagle nests in proximity to the Project area. No new nests were identified. In the event that an eagle nest is later located and determined to be occupied, efforts would be made to minimize potential impacts from construction activities which may include alteration of pole locations or scheduling construction to avoid nesting season.

[31] See complete table of occurrences in RPA at 87-89.

6.0 Comparison of Alternative Routes Potential Impacts

Alternative routes, alternative route segments and modifications to Xcel Energy's proposed alignment were discussed during the scoping meeting and in comments received during the scoping comment period. Six alternatives, as described below (See **Appendix A.3** for alternative route maps), were incorporated in the scope or amended scope of the EA. Their comparative impacts with the proposed route are evaluated herein.[32]

Highway 41 Route Alternative

One of the route alternatives proposed would replace Segment 3 of the Applicant's proposed route between Highway 5 and the intersection of Highway 41 and Highway 7. The route alternative follows Highway 5 west to where it intersects with Highway 41 and then follows Highway 41 north to connect with the existing 69 kV line near Brendan Pond.

Highway 7 Route Alternatives

For the area traversed by the proposed Segments 5, 6, 7 and 8, four different route alternatives were proposed. All four of the alternatives follow Highway 7 for at least a portion of their length, and two of them (3 and 4) require a location along that route for a new Deephaven Substation.

1. Highway 7 Alternative 1: This route alternative follows Highway 7 east from the Excelsior Substation to Vinehill Road, then goes north along Vinehill Road to the Deephaven Substation. Highway 7 Alternative 1 then follows the existing 69 kV line east out of the Deephaven Substation.

2. Highway 7 Alternative 2: This route alternative follows Highway 7 east from the Excelsior Substation to Vinehill Road, then goes north along Vinehill Road to the Deephaven Substation. The transmission line would return along Vinehill Road as a double-circuited 115/115 kV line. From the intersection of Vinehill Road and Highway 7, this route alternative then follows Highway 7 east to connect with the existing 69 kV line at the intersection of Highway 7 and Highway 101.

3. Highway 7 Alternative 3: This route alternative includes building a new Deephaven Substation at a new location near the intersection of Highway 7 and Highway 101. This route alternative places a new 115 kV transmission line along Highway 7 between the Excelsior Substation and the new Substation.

4. Highway 7 Alternative 4: This route alternative includes building a new Deephaven Substation at a new location near the intersection of Highway 7 and Vinehill Road. This route alternative places a new 115 kV transmission line along Highway 7 between the Excelsior Substation and the intersection of Highway 7 and Highway 101.

[32] New construction along the alternatives would require expanding the right-of-way to 75 feet.

Highway 5 Route Alternative

After further review of the Highway 5 System Alternative (see Section 4.5), Xcel Energy requested that the Department of Commerce Deputy Commissioner amend the Scoping Decision to include a route alternative along Highway 5. Xcel Energy and EFP agree that the alternative can meet the stated need of the Project. The Deputy Commissioner amended the Scoping Decision on October 30, 2012.

The new alternative would utilize the existing double-circuit transmission structures currently running from Westgate Substation along Highway 5 and down to Structure #57. The existing distribution line would need to be relocated. This alternative would require a short segment of new 69 kV line and a new substation near the Bluff Creek Substation. The alternative would replace Segments 2B-10 of the proposed route (see **Figure 12**).

6.1 Highway 41 Route Alternative

The Highway 41 Route Alternative would replace Segment 3 of the Applicant's proposed route (see **Figure 6**).

Figure 6. Highway 41 Alternative

The Hwy 41 alternative was suggested by residents along Segment 3. One concern expressed by proponents stems from the fact that the proposed line runs through a number of natural areas (see **Tables 14-16**). However, as the proposed line is a rebuild, those areas have already been impacted. Moving the line could relieve some of those impacts, although development has grown up near much of the line since its construction.

The proposed segment does have more acres of NWI wetlands. It crosses Bluff Creek and a water body known as Brendan Pond. (There is currently a transmission pole located in the pond, although it may be possible to re-engineer the span to avoid that occurrence in the rebuild). The Hwy 41 alternate is longer and occupies nearly 50 percent more acreage. It also includes significantly more developed area (see **Table 13**).

Table 13. Land Cover[33] [34] (Hwy 41)

Cover Type	Hwy 41 (acres)	Proposed (acres)
Forest/Shrub land	7.00	9.96
Developed/High Intensity	2.94	1.37
Developed/Low Intensity	27.30	11.37
Developed/Medium Intensity	9.54	1.64
Developed/Open Space	17.10	8.99
Pasture/Hay/Cropland	10.13	13.32
Herbaceous & Woody Wetlands	0.00	0.70
Open Water	0.00	1.79
TOTAL	**74.22**	**49.14**

Table 14. National Wetlands Inventory (Hwy 41)

County	Cowardin Type[35]	Count	Approx. Area (Acres)
Highway 41			
Carver	PEM/SSC1	1	0.31
	PEMC	5	1.61
	PFO1C	1	0.00
	PUBF	1	0.08
	PUBG	1	1.48
	TOTAL	**9**	**3.48**
Proposed			
Carver	PEMAd	1	1.62
	PEMC	2	0.32
	PEMCd	1	4.56
	PFO1C	1	0.1
	PSS1C	1	0.4
	PUBF	1	0.07
	PUBG	1	3.24
	TOTAL	**8**	**10.31**

[33] USDA National Agricultural Statistics Service (USDA NASS), 2010
[34] Tables represent data for area within 200-foot route width for both proposed and alternative routes.
[35] http://www.fws.gov/wetlands/Data/Wetland-Codes.html

Table 15. Public Water Inventory (Hwy 41)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 41		
Wetland	Unnamed	10-132W
Proposed		
PWI Watercourse	Bluff Creek	
Wetland	Unnamed	10-132W

Table 16. Parks and Recreation (Hwy 41)

Park*	City or Town	Park Amenities																	
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 41																				
Lake Minnewashta Regional Park	Chanhassen		X		X		X	X	X			X	X	X	X	X		X		X
Chanhassen Nature Preserve	Chanhassen							X						X						
Minnesota Landscape Arboretum	Chanhassen							X				X		X	X	X	X			
Bluff Creek Headwaters Preserve	Chanhassen							X	X					X						
Proposed																				
Pinehurst Preserve at Lake Harrison	Chanhassen													X						
Lake Minnewashta Regional Park	Chanhassen		X		X		X	X	X			X	X	X	X	X		X		X

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

Even though the proposed route goes through some natural areas, it actually has less impact on parks and recreation areas (see **Table 16**). The proposed route skirts the edge of Pinehurst Preserve and Lake Minnewashta Regional Park for several hundred feet. Pinehurst Preserve is a nature preserve and does not have recreational facilities. The proposed route is on the opposite side of Hwy 41 from the regional park and would not have recreational impacts. The alternate route along Hwy 41 parallels the Park for over a mile. It also crosses land in the Minnesota Landscape Arboretum and the Chanhassen Nature Preserve. However, the proposal and the alternative would each have only a visual, aesthetic impact on the areas, as neither would encroach farther than the edges of these designated areas.

Another issue raised by proponents of the Hwy 41 Alternative is the proximity of the existing line to homes in the area. While many of these homes were built along the existing route, homeowners expressed concerns that the larger structures might have greater visual and property value impacts and perceived health impacts. However, there are homes in close proximity to the alternative as well. As to homes within the closest proximity to the lines (0-50 ft.), the proposal has three homes, while the alternative has two (see **Table 17**). Hwy 41 has fewer homes between 50-100 feet from the line. However, this distance is outside the ROW even if it were expanded from 50 ft. to 75 ft. While the proposed route has fewer homes within 200 feet, moving the alignment to Hwy 41 would not eliminate perceived impacts; it would merely shift them to a different set of homeowners by creating a new right-of-way.[36]

.

Table 17. Residences and Businesses in Proximity to Transmission Line (Hwy 41)

Residential Structures					**Commercial Operations**				
Distance in Feet				**Total**	Distance in Feet				**Total**
0-25	26-50	51-100	101-200		0-25	26-50	51-100	101-200	
Highway 41									
0	2	5	33	**40**	0	0	6	1	**7**
Proposed									
0	3	23	52	**78**	0	0	1	1	**2**

[36] Note: Mn/DOT's only stated concern with the Hwy 41 alternate is avoiding the Traffic Control Signal System at the intersection of TH 41 and TH 5 while maintaining a perpendicular crossing of both trunk highways (see Appendix B).

The difference in cost between the proposal and the alternative would be $60.18 million (see **Table 4**) compared to $62.96 million (see **Table 18**). The difference would lie in the slightly longer alternative and the requirement to purchase easements along Hwy 5 and Hwy 41 (no additional ROW purchase is anticipated for the proposed route). Note that in the estimated costs tables, variations from the proposed route costs appear in blue text.

The projected future costs (after completion of the 2014 Project) are the same for the originally proposed project and each of the alternates except for the Hwy 5 Alternative (see **Table 48**). They need to be included to account for the different system configuration of that alternative, and the future impacts of employing that choice.

Table 18. Estimated Project Costs (Hwy 41)

Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
Deephaven Substation Conversion	6.34	2014
Excelsior Substation Conversion	4.39	2014
Westgate-Deephaven Line Conversion	5.70	2014
Deephaven-Excelsior Line Conversion	2.77	2014
Excelsior-Bluff Creek Line Conversion and New 115 kV along Hwy 5 and Hwy 41	4.90	2014
Easements along Hwy 5 and Hwy 41	2.00	2014
Project Costs through 2014	**$28.26**	
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$62.96**	

6.2 Highway 7 Route Alternatives

The Hwy 7 alternatives are variations on a theme to avoid routing along Lake Minnetonka and the Lake Minnetonka Regional Trail. Each variation moves some or all of the proposed 115 kV line to run along Hwy 7.

It should be clear at the outset that each of the four Hwy 7 alternatives avoids rebuilding the existing 69 kV in its current alignment to at least some degree; in no instance does the placement of all or portions of the proposed 115 kV line along Hwy 7 eliminate the existing 69 kV line, nor does it completely eliminate the existing Deephaven Substation off Vinehill Road. Whichever, if any of these alternatives were implemented, the 69 kV line would continue to exist through Excelsior, Shorewood, Greenwood, Deephaven and Minnetonka. The avoided impact would be the replacement of the existing line with larger, steel 115 kV structures.

Alternative 1
Highway 7 Alternative 1 would replace Segments 5 and 6 of the Applicant's proposed route (see **Figure 7** below).

Figure 7. Highway 7 Alternative 1

Xcel Energy had considered this alternative in their preliminary reviews.[37] They chose not to pursue the alternative for two main reasons: 1) the alternative adds the costs of purchasing new easements (see **Table 24**) as opposed to using the existing easements on the proposed line; and 2) the alternative would require significant clearing of trees and vegetation along Vinehill Road (see **Figure 8**).

Table 19. Land Cover (Hwy 7-1)

Cover Type	Hwy 7-1 (acres)	Proposed (acres)
Forest/Shrub land	8.31	5.99
Developed/High Intensity	6.16	6.52
Developed/Low Intensity	25.83	24.19
Developed/Medium Intensity	19.59	11.02
Developed/Open Space	16.00	20.93
Pasture/Hay/Cropland	0.49	0.80
Herbaceous & Woody Wetlands	0.22	0.31
Open Water	0.00	2.67
TOTAL	**76.60**	**72.42**

Table 20. National Wetlands Inventory (Hwy 7-1)

County	Cowardin Type	Count	Approx. Area (Acres)
Highway 7-1			
Hennepin	PEM/UBF	1	0.04
	PEMC	3	0.29
	PUBF	2	0.33
	PUBG	1	0.00
	TOTAL	**6**	**0.66**
Proposed			
Hennepin	L1UBH	3	3.51
	PEM/UBF	1	0.02
	PEMC	3	0.50
	PEMF	5	2.12
	PFO1C	1	0.36
	PUBF	1	0.04
	PUBG	1	0.00
	TOTAL	**15**	**6.55**

[37] RPA at 23-27

Table 21. Public Water Inventory (Hwy 7-1)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 7-1		
Basin	Minnetonka-Lower Lake	27-133 P
Proposed		
Basin	Minnetonka-Lower Lake	27-133 P
Basin	Minnetonka-St. Albans Bay	27-133 P
Basin	Minnetonka-Carson's Bay	27-133 P
Basin	William	27-142 P
Wetland	Unnamed	27-882 W
Wetland	Unnamed	27-881 W

Figure 8. Existing Foliage along Vinehill Road

The first two Hwy 7 alternatives both make use of Vinehill Road. The Hwy 7-1 Alternative would place a single-circuit 115 kV transmission line along this narrow roadway. Xcel Energy estimated a total of 8.9 acres of wooded area would have to be cleared if pursuing the Hwy 7-1 Alternative.[38] The alternative would have lesser impacts on wetlands and open water areas (see **Tables 19-21**). However, all such impacts to wetland areas along the alternative would be new.

[38] *Id*. at 24

Table 22. Parks and Recreation (Hwy 7-1)

Park*	City or Town	Park Amenities																		
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 7-1																				
Lake Minnetonka L Regional Trail	Multiple							X	X											
Burton Park	Deephaven							X				X	X	X						
Proposed																				
Lake Minnetonka L Regional Trail	Multiple							X	X											
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X								
Burton Park	Deephaven							X				X	X	X						
Carson's Bay Landing	Deephaven											X	X					X		

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

Table 23. Residences and Businesses in Proximity to Transmission Line (Hwy 7-1)

Residential Structures					Commercial Operations				
Distance in Feet					Distance in Feet				
0-25	26-50	51-100	101-200	**Total**	0-25	26-50	51-100	101-200	**Total**
Highway 7-1									
0	0	14	47	**61**	6	7	5	7	**25**
Proposed									
0	3	19	47	**69**	1	5	5	7	**18**

The Proposed Route has three homes within 50 feet of the transmission line, as opposed to none along Hwy 7 Alternative 1. However the alternative has 13 businesses within 50 feet of the transmission line. (Each of the Highway 7 alternatives would place 13 commercial structures within 50 feet of the transmission line.) The original proposal has six businesses within 50 feet (see **Table 23**).

There should be minimal impact to Mn/DOT ROW along Hwy 7 with this or any of the other Hwy 7 alternatives.[39]

The difference in cost between the proposal and this alternative would be $60.18 million (see **Table 4**) compared to $63.18 million (see **Table 24**). The difference lies in the requirement to purchase easements along Hwy 7 and Vinehill Road (no additional ROW purchase is anticipated for the proposed route).

Table 24. Estimated Project Costs (Hwy 7-1)

Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
Deephaven Substation Conversion	6.34	2014
Excelsior Substation Conversion	4.39	2014
Westgate-Deephaven Line Conversion	5.70	2014
Deephaven-Excelsior Line Conversion	2.77	2014
Excelsior-Bluff Creek Line Conversion	4.12	2014
Easements along Hwy 7 and Vinehill Road	3.00	2014
Project Costs through 2014	**$28.48**	
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$63.18**	

[39] MnDOT projects planned on TH 7 from Minnetonka Blvd to County Road 101 include sign replacement along the corridor in 2016 and signal replacement at Vine Hill Rd. in 2017.

Alternative 2

Highway 7 Alternative 2 would replace Segments 5, 6, 7 and 8A of the Applicant's proposed route (see **Figure 9** below).

Figure 9. Highway 7 Alternative 2

The relative impacts of Hwy 7 Alternative 2 are similar to Hwy 7 Alternative 1. There are two differences. The first is that the 115 kV along Vinehill Road would need to be a double-circuit, with one side moving into Deephaven Substation, while the other moves out of the substation back down to Highway 7. This may exacerbate the issue of vegetation clearance along Vinehill Road (see **Figure 8**) depending on structures used. There are wooded areas along segments 7 and 8A as well, but the ROW is already cleared in those areas.

Those two segments are the other difference from Hwy 7 Alternative 1; they are left unaltered in this case while a new line is installed along Highway 7 between Vinehill Road and Highway 101. Instead of rebuilding along the heavily residential areas in segments 7 and 8A, the line would be placed along a central commercial corridor (see **Table 29**). The areas along segments 7 and 8A also have a much more extensive wetland complex (see **Tables 26** and **27**).

In addition, Hwy 7 Alternate 2 would require some placement within Mn/DOT ROW, requiring a utility permit. While Mn/DOT is not considering expanding the ROW at this time, any changes could add the expense of moving the new installation, including new ROW acquisition.

The difference in cost between the proposal and this alternative would be $60.18 million (see **Table 4**) compared to $65.18 million (see **Table 30**). The difference lies in the requirement to purchase easements along Hwy 7 and Vinehill Road (no additional ROW purchase is anticipated for the proposed route).

Table 25. Land Cover (Hwy 7-2)

Cover Type	Hwy 7-2 (acres)	Proposed (acres)
Forest/Shrub land	9.71	13.67
Developed/High Intensity	10.50	11.60
Developed/Low Intensity	38.88	37.54
Developed/Medium Intensity	25.20	17.93
Developed/Open Space	20.32	39.95
Pasture/Hay/Cropland	0.49	1.92
Herbaceous & Woody Wetlands	0.22	0.84
Open Water	0.18	2.67
TOTAL	**105.31**	**125.55**

Table 26. National Wetlands Inventory (Hwy 7-2)

County	Cowardin Type	Count	Approx. Area (Acres)
Highway 7-2			
Hennepin	PEM/UBF	1	0.04
	PEMC	3	0.29
	PUBF	4	0.51
	PUBG	1	0.00
	TOTAL	**9**	**0.84**
Proposed			
Hennepin	L1UBH	3	3.51
	PEM/SS1C	2	0.23
	PEM/SS1Cd	2	1.69
	PEM/UBF	1	0.02
	PEMC	7	1.86
	PEMDd	1	0.05
	PEMF	6	3.46
	PFO1C	1	0.36
	PSS1C	1	0.17
	PUBF	2	0.10
	PUBG	2	0.05
	PUBGx	1	0.03
	TOTAL	**29**	**11.54**

Table 27. Public Water Inventory (Hwy 7-2)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 7-2		
Basin	Como	27-145 P
Proposed		
Basin	Minnetonka-Lower Lake	27-133 P
Basin	Minnetonka-St. Albans Bay	27-133 P
Basin	Minnetonka-Carson's Bay	27-133 P
Basin	William	27-142 P
Wetland	Unnamed	27-882 W
Wetland	Unnamed	27-881 W
Wetland	Unnamed	27-874 W

Table 28. Parks and Recreation (Hwy 7-2)

Park*	City or Town	Park Amenities																	
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 7-2																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Burton Park	Deephaven							X				X	X	X					
Proposed																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X							
Burton Park	Deephaven							X				X	X	X					
Carson's Bay Landing	Deephaven											X	X					X	
Hineline Property	Deephaven													X					

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

Table 29. Residences and Businesses in Proximity to Transmission Line (Hwy 7-2)

Residential Structures					Commercial Operations				
Distance in Feet					Distance in Feet				
0-25	26-50	51-100	101-200	**Total**	0-25	26-50	51-100	101-200	**Total**
Highway 7-2									
0	0	22	72	**94**	6	17	0	15	**38**
Proposed									
0	5	42	85	**132**	1	5	6	11	**23**

Table 30. Estimated Project Costs (Hwy 7-2)

Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
Deephaven Substation Conversion	6.34	2014
Excelsior Substation Conversion	4.39	2014
Westgate-Deephaven Line Conversion	5.70	2014
Deephaven-Excelsior Line Conversion	2.77	2014
Excelsior-Bluff Creek Line Conversion	4.12	2014
Easements along Hwy 7 and Vinehill Road	5.00	2014
Project Costs through 2014	**$30.48**	
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$65.18**	

Alternative 3

Highway 7 Alternative 3 would replace Segments 5, 6, 7 and 8A of the Applicant's proposed route (see **Figure 10** below) and create a new Deephaven Substation at the intersection of Highway 7 and Highway 101.

Figure 10. Highway 7 Alternative 3

Highway 7 Alternate 3 is the third variation of the use of Highway 7 and has many similar comparative impacts. It has the same effect as the first two of, on the one hand transferring impacts from highly residentially areas, but on the other moving them to a concentrated commercial corridor (see **Table 35**). This alternative would have the same impact as other Hwy 7 alternatives of placing more businesses in closer proximity to the transmission line.

It differs from the first two in its avoidance of Vinehill Road by establishing a new Deephaven Substation east of Highway 101. This effectively eliminates the new impacts on trees and homeowners along the road, as well as eliminating the need to expand the existing Deephaven Substation. This is countered in one sense by the necessity of building a new substation and creating a new distribution system in the area to compensate for that movement.

This alternative has a lesser impact on wetlands and natural areas than the proposed Project (see **Tables 32-34**), at least in a tabular sense. Again it should be noted the existing transmission line and substation would not be removed, rather they would not be expanded. The impacts on the alternative would be on new ROW. As in Hwy 7 Alternatives 1 and 2, there would be the issues of structure placement within the Mn/DOT ROW.

Table 31. Land Cover (Hwy 7-3)

Cover Type	Hwy 7-3 (acres)	Proposed (acres)
Forest/Shrub land	5.94	13.67
Developed/High Intensity	12.18	11.60
Developed/Low Intensity	33.73	37.54
Developed/Medium Intensity	24.29	17.93
Developed/Open Space	10.45	39.95
Pasture/Hay/Cropland	0.49	1.92
Herbaceous & Woody Wetlands	0.22	0.84
Open Water	0.00	2.67
TOTAL	**87.30**	**125.55**

Table 32. National Wetlands Inventory (Hwy 7-3)

County	Cowardin Type	Count	Approx. Area (Acres)
Highway 7-3			
Hennepin	PEM/FO1Cd	1	0.12
	PEM/UBF	1	0.04
	PEMC	3	0.29
	PUBF	3	0.33
	PUBG	1	0.00
	TOTAL	**8**	**0.78**
Proposed			
Hennepin	L1UBH	3	3.51
	PEM/SS1C	2	0.23
	PEM/SS1Cd	2	1.69
	PEM/UBF	1	0.02
	PEMC	7	1.86
	PEMDd	1	0.05
	PEMF	6	3.46
	PFO1C	1	0.36
	PSS1C	1	0.17
	PUBF	2	0.10
	PUBG	2	0.05
	PUBGx	1	0.03
	TOTAL	**29**	**11.54**

Table 33. Public Water Inventory (Hwy 7-3)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 7-3		
Basin	Como	27-145 P
Wetland	Unnamed	27-767 W
Proposed		
Basin	Minnetonka-Lower Lake	27-133 P
Basin	Minnetonka-St. Albans Bay	27-133 P
Basin	Minnetonka-Carson's Bay	27-133 P
Basin	William	27-142 P
Wetland	Unnamed	27-882 W
Wetland	Unnamed	27-881 W
Wetland	Unnamed	27-874 W

Table 34. Parks and Recreation (Hwy 7-3)

Park*	City or Town	Park Amenities																	
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 7-3																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Proposed																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X							
Burton Park	Deephaven							X				X	X	X					
Carson's Bay Landing	Deephaven											X	X					X	
Hineline Property	Deephaven													X					

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

Table 35. Residences and Businesses in Proximity to Transmission Line (Hwy 7-3)

Residential Structures					Commercial Operations				
Distance in Feet					Distance in Feet				
0-25	26-50	51-100	101-200	**Total**	0-25	26-50	51-100	101-200	**Total**
Highway 7-3									
0	0	8	55	**63**	6	9	7	17	**39**
Proposed									
0	5	42	85	**132**	1	5	6	11	**23**

The biggest relative impact of this alternative may be cost. The difference between the proposal and this alternative would be over 20 percent, $60.18 million (see **Table 4**) compared to $73.07 million (see **Table 36**). The difference lies in the requirement to purchase easements along Hwy 7, but especially the costs associated with building the new Deephaven Substation. These costs include construction, land acquisition and the development of the new, associated distribution.

Table 36. Estimated Project Costs (Hwy 7-3)

Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
New Deephaven Substation	10.00	2014
Excelsior Substation Conversion	4.39	2014
Westgate-New Deephaven Sub Line	5.30	2014
New Deephaven Sub-Excelsior Line	3.20	2014
Excelsior-Bluff Creek Line Conversion	4.12	2014
Easements along Hwy 7	5.00	2014
Deephaven Substation Land Acquisition	2.50	2014
Distribution from New Deephaven Sub	1.70	2014
Project Costs through 2014	**$38.37**	

Facility/Acquisition	Cost (Millions)	Year
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$73.07**	

Alternative 4

Highway 7 Alternative 4 would replace Segments 5, 6, 7 and 8A of the Applicant's proposed route (see **Figure 11** below) and create a new Deephaven Substation at the intersection of Highway 7 and Vinehill Road.

Figure 11. Highway 7 Alternative 4

Highway 7 Alternative 4 has all the same comparative impacts as Highway 7 Alternative 3. The only difference is the placement of the new Deephaven Substation. It should be noted that substation locations for these two alternatives is tentative; further engineering and property studies would be required.

Table 37. Land Cover (Hwy 7-4)

Cover Type	Hwy 7-4 (acres)	Proposed (acres)
Forest/Shrub land	5.79	13.67
Developed/High Intensity	12.09	11.60
Developed/Low Intensity	31.92	37.54
Developed/Medium Intensity	24.21	17.93
Developed/Open Space	9.96	39.95
Pasture/Hay/Cropland	0.49	1.92
Herbaceous & Woody Wetlands	0.22	0.84
Open Water	0.00	2.67
TOTAL	**84.69**	**125.55**

Table 38. National Wetlands Inventory (Hwy 7-4)

County	Cowardin Type	Count	Approx. Area (Acres)
Highway 7-4			
Hennepin	PEM/UBF	1	0.04
	PEMC	3	0.29
	PUBF	3	0.29
	PUBG	1	0.00
	TOTAL	**8**	**0.62**
Proposed			
Hennepin	L1UBH	3	3.51
	PEM/SS1C	2	0.23
	PEM/SS1Cd	2	1.69
	PEM/UBF	1	0.02
	PEMC	7	1.86
	PEMDd	1	0.05
	PEMF	6	3.46
	PFO1C	1	0.36
	PSS1C	1	0.17
	PUBF	2	0.10
	PUBG	2	0.05
	PUBGx	1	0.03
	TOTAL	**29**	**11.54**

Table 39. Public Water Inventory (Hwy 7-4)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 7-4		
Basin	Como	27-145 P
Proposed		
Basin	Minnetonka-Lower Lake	27-133 P
Basin	Minnetonka-St. Albans Bay	27-133 P
Basin	Minnetonka-Carson's Bay	27-133 P
Basin	William	27-142 P
Wetland	Unnamed	27-882 W
Wetland	Unnamed	27-881 W
Wetland	Unnamed	27-874 W

Table 40. Parks and Recreation (Hwy 7-4)

Park*	City or Town	Park Amenities																	
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 7-4																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Proposed																			
Lake Minnetonka L Regional Trail	Multiple							X	X										
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X							
Burton Park	Deephaven							X				X	X	X					
Carson's Bay Landing	Deephaven											X	X					X	
Hineline Property	Deephaven													X					

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

Table 41. Residences and Businesses in Proximity to Transmission Line (Hwy 7-4)

Residential Structures					Commercial Operations				
Distance in Feet				Total	Distance in Feet				Total
0-25	26-50	51-100	101-200		0-25	26-50	51-100	101-200	
Highway 7-4									
0	1	11	56	**68**	6	8	7	16	**37**
Proposed									
0	5	42	85	**132**	1	5	6	11	**23**

As with Highway 7 Alternative 3, the largest comparative impact of Highway 7 Alternative 4 is cost. This is the most expensive alternative at $75.17 million (see **Table 42**), which is a 25 percent increase in costs compared to the original Proposal at $60.18 million (see **Table 4**). Again, the new easement costs account for some of the difference, with additional expenses associated with construction and land acquisition for the new substation.

Table 42. Estimated Project Costs (Hwy 7-4)

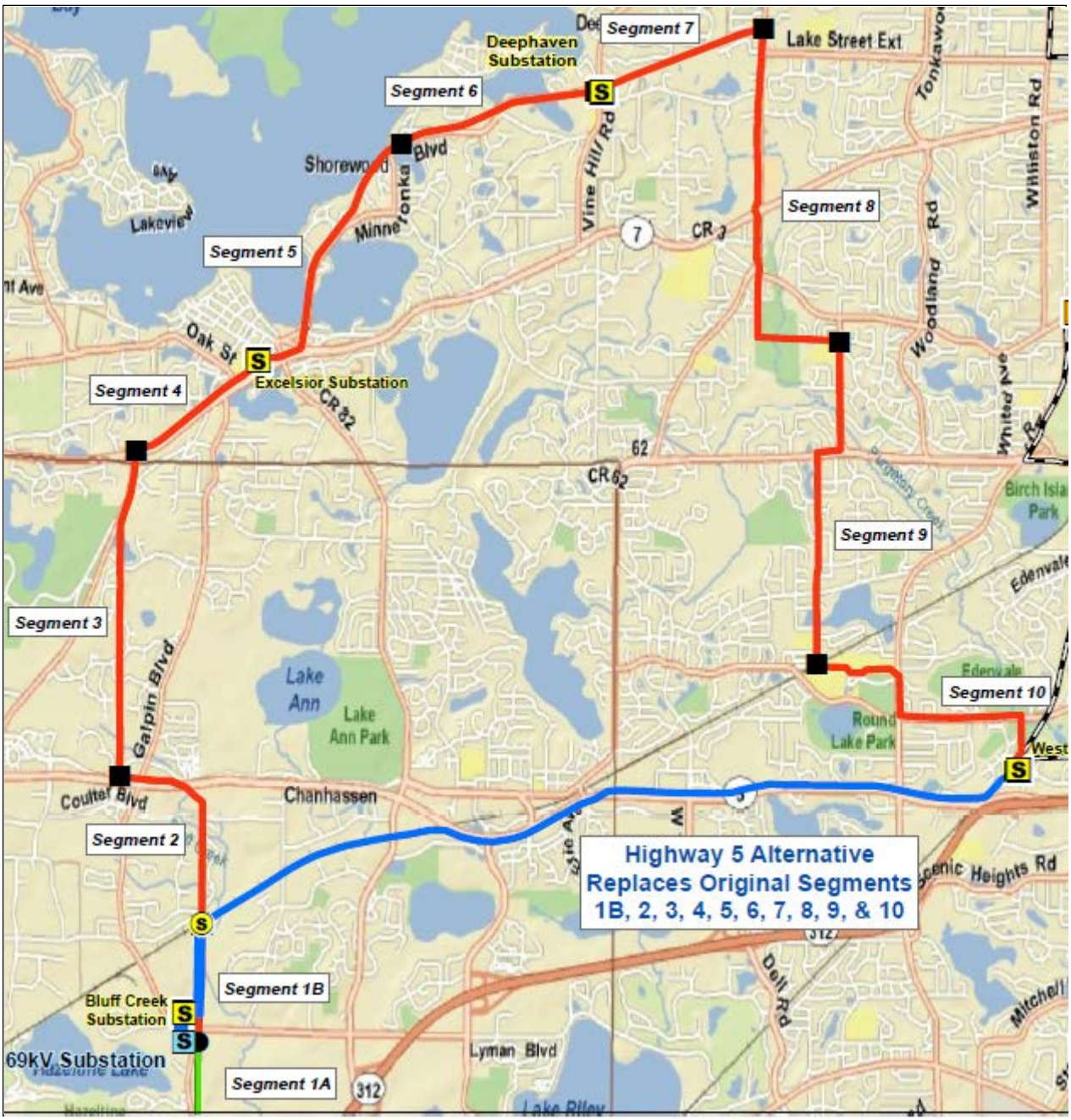
Facility/Acquisition	Cost (Millions)	Year
Scott County Substation Termination	0.90	2014
Westgate Substation Termination	1.26	2014
New Deephaven Substation	10.00	2014
Excelsior Substation Conversion	4.39	2014
Westgate-New Deephaven Sub Line	6.40	2014
New Deephaven Sub-Excelsior Line	2.10	2014
Excelsior-Bluff Creek Line Conversion	4.12	2014
Easements along Hwy 7	5.00	2014
Deephaven Substation Land Acquisition	5.00	2014
Distribution from New Deephaven Sub	1.30	2014
Project Costs through 2014	**$40.47**	

Facility/Acquisition	Cost (Millions)	Year
New Bluff Creek 34.5 kV Distribution Sub	8.50	2016
Scott County 345/115 kV Addition	21.70	2023
Bluff Creek in-out (Ring Bus)	4.50	2035
Total	**$75.17**	

6.3 Highway 5 Route Alternative

The Highway 5 Route Alternative would replace all of the proposed route segments except Segment 1A from Scott County Substation to a new substation south of Bluff Creek Substation (see **Figure 12** below).

Figure 12. Highway 5 Alternative



The alternatives discussed above are alternatives to the Proposed Route that address the need and solution as described in the Certificate of Need Application. The Highway 5 Alternative is quite different in that, while it is indeed an alternative to the Proposed Route, it is also a different system approach to solving the electrical needs of the area. As presented by Xcel Energy,[40] instead of the Project laid out in the Route Permit Application, the alternative project would consist of the following:

- A new 115/69 kV substation in close proximity to the existing Bluff Creek Substation (New Substation);
- A new 69 kV line from Structure #57 to the New Substation, and termination of the existing 69 kV line from Excelsior Substation into the New Substation;
- Operate the existing 115 kV transmission line from Scott County Substation to Structure #57 at 115 kV, by terminating it into the New Substation. The line is capable of operating at 115 kV but is currently operated at 69 kV;
- Operate the existing 115 kV line from Structure #57 to Westgate Substation along Highway 5 at 115 kV. It is built to double circuit, with both circuits capable of operating at 115 kV. Only one of the two circuits is currently operating at 115 kV and the other circuit is being used as a 34.5 kV distribution feeder;
- Construct a new 34.5 kV distribution feeder from Westgate Substation to replace the 115 kV line from Structure #57 to Westgate Substation which currently operates at 34.5 kV;
- Transmission line modifications at Westgate Substation, the New Substation, and at the Scott County Substation;
- Upgrade the Westgate Substation 115/69 kV transformer, serving Excelsior and Deephaven substations, to 70 MVA or larger capacity; and
- Upgrade sections of the existing 69 kV line between Westgate and Deephaven substations to a higher capacity 69 kV line (68 MVA or higher).

The immediate impact to persons and businesses along the Proposed Route or the other alternative routes would be a delay in upgrading or replacing the existing 69 kV line. There would eventually (predictably around 2023) be upgrades to the existing line. These would keep the loop between Excelsior Substation and Westgate Substation at 69 kV, however, the replacement would likely include heavier conductor and taller, sturdier poles.

There would be only nominal impacts along the Highway 5 115 kV line, as that construction is already in place. New construction for the Highway 5 Alternative would be a short section of 69 kV line and a new substation near Bluff Creek. In the Proposed Route, the distribution system would still need to be upgraded (predictably around 2016), including a new distribution substation near Bluff Creek. The Highway 5 Alternative would move up that timetable by immediately installing a 115-34.5 kV bank at the New Substation as part of the new system.

[40] Xcel Energy letter, January 9, 2013, eDocument no. 20131-82592-01 at 4-5

This analysis includes the same tabular comparisons as the above alternatives for the sake of continuity. In those cases, where a particular segment was being replaced by a new build, there was a certain validity to comparative statistics. In this case, that may be less true in that neither the Proposed Route nor the Highway 5 Alternative would employ new ROW. However, there would be construction of a 115 kV line along the old ROW in the original plan, while the major construction in the Highway 5 Alternative would be an approximately 3.6 mile 34.5 kV feeder.

Generally, the number of persons or resources with a potential impact would be greater in the Proposed Route (or any variation thereof per the above alternatives) than with the Highway 5 Alternative. Simply, this alternative is considerably shorter. In fact the length of the alternative brings the Project under the threshold for requiring a Certificate of Need (under 10 miles).[41] The figures for the Proposed Route compare a length of approximately 14 miles to the Highway 5 Alternative at approximately four miles.

In other words, comparison of total counts in the tables obviously favors the alternative over the proposal. However, there should be a caveat to also look at relative impacts at a local level rather than just project totals. For example, the proposal has nearly double the acreage of Forest/Shrub land cover (see **Table 43**); however, the Highway 5 Alternative has a significantly higher percentage of Forest/Shrub land cover per mile than the Proposed Route.

In the earlier alternative comparisons, it was fairly straightforward to compare particular items, as one alternative effectively replaced a roughly similar length segment or segments. In this case, even if the number is larger due to total length of project, those impacts may be diffused over that length. However, in some instances, such as the area of open water (see **Table 43)**, the impact is clearly diminished by using the Highway 5 Alternative. The point is that the comparison of these two options is not a simple counting exercise.

Table 43. Land Cover (Hwy 5)

Cover Type	Hwy 5 (acres)	Proposed (acres)
Forest/Shrub land	23.17	45.70
Developed/High Intensity	20.45	26.47
Developed/Low Intensity	32.35	119.79
Developed/Medium Intensity	34.16	48.98
Developed/Open Space	11.62	83.84
Pasture/Hay/Cropland	39.26	36.23
Herbaceous & Woody Wetlands	3.97	5.77
Open Water	0.22	5.60
TOTAL	**165.20**	**372.38**

[41] This presumes that no alteration of the Highway 5 Alternative would be implemented by the Commission in its own route alternative review, which could conceivably bring the Project back above the CN threshold level.

Table 44. National Wetlands Inventory (Hwy 5)

County	Cowardin Type	Count	Approx Area (Acres)
Highway 5			
Carver	PEM/SS1C	1	1.24
	PEMAd	2	3.28
	PEMC	2	0.99
	PEMCd	3	5.73
	PEMF	1	0.53
	PFO1C	2	0.16
	TOTAL	**11**	**11.93**
Hennepin	PEMA	1	0.01
	PEMCd	1	2.39
	PEMF	1	2.10
	PEMFd	1	0.26
	TOTAL	**4**	**4.76**
Total Wetlands in both Counties		**15**	**16.69**
Proposed			
Carver	PEMAd	2	3.91
	PEMC	2	0.32
	PEMCd	5	10.47
	PFO1C	4	1.17
	PUBF	1	0.07
	PUBG	1	3.24
	TOTAL	**15**	**19.18**
Hennepin	L1UBH	3	3.51
	PEM/SS1C	3	2.69
	PEM/SS1Cd	2	1.69
	PEM/UBF	1	0.02
	PEM/UBFh	1	0.25
	PEMC	11	6.72
	PEMCd	4	0.58
	PEMF	8	6.07
	PFO1C	2	0.59
	PUB/EMF	1	0.23
	PUBF	2	0.13

County	Cowardin Type	Count	Approx Area (Acres)
	PUBG	4	2.63
	PUBGx	2	0.16
	TOTAL	**44**	**25.17**
Total Wetlands in both Counties		**59**	**44.35**

Table 45. Public Water Inventory (Hwy 5)

Public Water Inventory Type	Public Water Name	Public Water ID
Highway 5		
Watercourse	Bluff Creek	
	Riley Creek	
Wetland	Unnamed	27-972 W
	Unnamed	27-984 W
Proposed		
Watercourse	Bluff Creek	
Watercourse	Unnamed to Purgatory Creek	
Watercourse	Purgatory Creek	
Basin	Minnetonka-Lower Lake	27-133 P
Basin	Minnetonka-St. Albans Bay	27-133 P
Basin	William	27-142 P
Basin	Minnetonka-Carson's Bay	27-133 P
Basin	Duck	27-69 P
Wetland	Unnamed	10-132 W
Wetland	Unnamed	27-895 W
Wetland	Unnamed	27-882 W
Wetland	Unnamed	27-881 W
Wetland	Unnamed	27-874 W
Wetland	Unnamed	27-874 W
Wetland	Unnamed	27-890 W
Wetland	Unnamed	27-820 W
Wetland	Unnamed	27-985 W
Wetland	Unnamed	27-987 W

Table 46. Parks and Recreation (Hwy 5)

Park*	City or Town	Park Amenities																		
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Highway 5																				
Bluff Creek Preserve	Chanhassen							X						X						
Mitchell Marsh Conservation Area	Eden Prairie							X						X						
Westgate Conservation Area	Eden Prairie							X						X						
Lake Minnetonka L Regional Trail	Multiple							X	X											
Proposed																				
Chanhassen Recreation Center	Chanhassen	X		X	X		X	X	X	X	X	X			X	X				
Pinehurst Preserve at Lake Harrison	Chanhassen													X						
Lake Minnewashta Regional Park	Chanhassen		X		X		X	X	X			X	X	X	X	X		X		X
Lake Minnetonka L Regional Trail	Multiple							X	X											
Village Hall Park	Deephaven	X	X	X	X		X			X	X	X								
Burton Park	Deephaven							X				X	X	X						
Carson's Bay Landing	Deephaven											X	X					X		
Hineline Property	Deephaven													X						
Kelly Park	Minnetonka							X			X	X			X		X			
Purgatory Park	Minnetonka						X	X	X					X		X				

Park*	City or Town	Park Amenities																	
		Playfield	Picnic Shelter	Tennis Courts	Play Structure	Hard Courts	Picnic Area	Walking Trails	Biking Trails	Outdoor Hockey	Warming House	Parking	Fishing	Nature Area	Restrooms	Handicap Access	Garden	Boat Access	Skate Park	Volleyball Court
Edenbrook Conservation Area	Eden Prairie							X						X						
Round Lake Community Park	Eden Prairie	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X		X
Edenvale Conservation Area	Eden Prairie							X						X						

**Parks, Recreation Areas, and Preserves within the 200-Foot-Wide Project Area*

As with the Highway 7, the Highway 5 Alternative tends to shift the burden from residential to commercial properties. However, the difference between possible impacts to residential areas fairly significantly favors Highway 5. This is particularly true in cases where houses are in close proximity to the transmission line. The Proposed Route has 67 homes within 50 feet of the line, with six within 25 feet of the line (see **Table 47**). Two of these homes are in Segment 9 and four in Segment 10, so they are not accounted for in any other alternative. Hwy 5 impacts a greater percentage of businesses than the Proposed Route, but has none within 25 feet.

Table 47. Residences and Businesses in Proximity to Transmission Line (Hwy 5)

Residential Structures					Commercial Operations				
Distance in Feet					Distance in Feet				
0-25	26-50	51-100	101-200	**Total**	0-25	26-50	51-100	101-200	**Total**
Highway 5									
0	2	9	25	**36**	0	11	7	22	**40**
Proposed									
6	61	153	272	**482**	1	11	12	29	**53**

Table 48. Estimated Project Costs (Hwy 5)

Facility/Acquisition	Cost (Millions)	Year
New Scott County and Westgate Substation 115 kV Terminations	2.70	2014
New 115/69 kV Substation by Bluff Creek	13.00	2014
New 69 kV Line from Structure #57 to New 115/69 kV Substation	0.70	2014
Easements for New 69 kV Line	0.20	2014
New 34.5 kV Feeder Line from Westgate West along Hwy 5	1.50	2014
New 115-34.5 kV Bank at New Substation	6.08	2014
Upgrade Westgate 115/69 kV Transformer to 112 MVA	2.03	2014
Upgrade Smaller Section of Westgate-Deephaven 69 kV Line	0.50	2014
Transmission Modifications at Westgate, Scott County and New Substations	2.00	2014
Project Costs through 2014	**$28.71**	
Scott County 345/115 kV Addition	21.70	2023
Upgrade Westgate-Deephaven 69 kV Line to 795 ACSR Conductor[42]	4.00	2023
Upgrade Deephaven-Excelsior 69 kV Line to 795 ACSR Conductor	1.90	2023
Upgrade Excelsior-Hazeltine 69 kV Line to 795 ACSR Conductor	2.70	2023
Upgrade both Deephaven Transformers to 50 MVA	2.50	2027
Total	**$61.51**	

[42] The timing for rebuild of these lines is dependent on their expected life. Most of the line segments would be reaching 70 years, the typical life of wood pole lines.

Table 48 above lays out the cost for each project element of the Highway 5 Alternative, which is a significantly different system configuration from the Proposed Route or any of the alternatives. The projected future costs (after completion of the 2014 Project) are the same for the originally proposed project and each of the alternates except for the Hwy 5 Alternative. In this alternative, as noted above, the upgrading of the 69 kV line is delayed, while the distribution upgrades are employed up front. Even given the significant system differences, the Project costs would be very similar, $60.18 million for the Proposed Route (see **Table 4**) against $61.51 million for the Highway 5 Alternative.

In the end, Xcel Energy has made a guarded statement of preference:

"[T]he Proposed Project and the Highway 5 Alternative meet the immediate identified needs in the area. However, the two alternatives offer different economic and engineering trade-offs with the Highway 5 alternative deferring the rebuild of the existing 69 kV system to a higher capacity. While neither system alternative is clearly superior, the Company supports the Highway 5 Alternative which would not require a Certificate of Need." [43]

Xcel Energy appears to be addressing economics and engineering within the Certificate of Need process when making this statement of support for the Highway 5 Alternative. It is the responsibility of this document to address the environmental issues that pertain both to the CN and the routing processes. Since Xcel Energy has not reviewed this document, we cannot assume that they made this statement of choice in full consideration of the entire human, socio-economic and environmental picture.

This document does not presume a preference for a system alternative or a route alternative. This Environmental Assessment (in lieu of an Environmental Report) presents a comparative analysis of systems and routes which has been entered into both dockets to help inform the debate.

[43] Xcel Energy letter, January 9, 2013, eDocument no. 20131-82592-01 at 2

7.0 Unavoidable Impacts

The Scott County-Westgate 115 kV transmission line rebuild project as proposed would have no significant unavoidable adverse impacts. It would not have the same level of impacts that are usually associated with the construction of a new transmission line due to the fact that it is a rebuild of an existing line. The bulk of the new impacts would be related to those short term impacts that are associated with the construction of the transmission line project. The long term impacts of the transmission line, those related to land and visual impacts, have already largely been realized with the existing line. As the proposed line would be located in essentially the same place as the existing line, the incremental long term impacts of changing out the structures for taller, steel poles would not result in significant changes. Operating a new transmission line at the higher voltage level of 115 kV would also not result in an environmental impact, e.g., the 115 kV configurations would have generally equal, or even lesser calculated magnetic flux densities than the existing 69 kV lines (see **Table 9**).

The Highway 5 Alternate would have similarly nominal unavoidable impacts.

In addition, there are few commitments of resources associated with this project that are irreversible and irretrievable, but those that do exist are primarily related to construction. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. For the existing line, land use has already been committed to transmission ROW. New lands would be similarly restricted if employing any alternatives.

Construction resources that would be used include aggregate resources, concrete, steel, and hydrocarbon fuel. These resources would be used to construct the project. During construction, vehicles would be traveling to and from the site utilizing hydrocarbon fuels. For commercial properties, especially those businesses within 50 feet of a potential new transmission line, business activity could be temporarily restricted during construction.

Appendix A – Maps

Appendix B – Blanding's Turtle Factsheet

Appendix C – Letters

Appendix D – EA Scoping Decision

Appendix E – Sample Route Permit