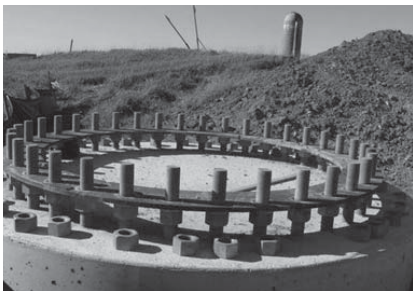

Draft Environmental Impact Statement

Fargo to St. Cloud 345 kV Transmission Line

PUC Docket No. E002, ET2/TL-09-1056

August 2010

office of energy security
Minnesota Department of Commerce

Fargo to St. Cloud
345 kV Transmission Line
Draft Environmental Impact Statement

August 2010

Abstract

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Abstract

Pursuant to the provisions of Minn. Stat., Chapter 216E, Great River Energy and Xcel Energy (the Applicants) filed a route permit application with the Minnesota Public Utilities Commission (the Commission) on October 1, 2009, for a permit to construct approximately 169 to 180 miles of 345 kilovolt transmission line from the Red River along the Minnesota and North Dakota border (between Clay and Wilkin counties) to St. Cloud. The Project is designed to increase generation outlet capability, improve regional reliability, and enhance local community reliability.

The Commission rules regarding route permits require a number of procedural steps, including public notice, information meetings, a draft and final environmental impact statement (EIS), a public-contested case hearing, and finally a decision by the Commission (Minn. Rules 7850.3900). The primary purpose of this draft EIS is to summarize the potential impacts of the Project and help the Commission make an informed decision on the best route. The Office of Energy Security (OES) Energy Facility Permitting (EFP) is part of the Minnesota Department of Commerce and is tasked with conducting environmental review of applications for transmission line 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 a proposed Project. The OES is responsible for developing the EIS for this Project.

Formal comments on the accuracy and completeness of the Draft EIS will be accepted through Monday, October 18, 2010. Please refer to PUC Docket No. E002, ET2/TL-09-1056 in all

correspondence. Comments should be sent by e-mail, fax, or U.S. mail to Mr. David Birkholz (contact information above). Comments may also be submitted online at:

http://energyfacilities.puc.state.mn.us/publiccomments.html.

A copy of this Draft Environmental Impact Statement can be reviewed at the following libraries:

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Saint Cloud, MN 56301
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The Office of Energy Security will be holding public information meetings on this Draft EIS shortly after publication; a separate notice will be provided to the public regarding the times and dates of these meetings.

A public hearing on the project will also be held as a separate proceeding. The Commission has turned the process over to the Office of Administration Hearings to hold the hearing. The hearing will be conducted by Administrative Law Judge (ALJ) Beverly Jones Heydinger, who will ensure that the record created at the hearing is preserved and transmitted to the Commission. The ALJ will prepare a report that will include proposed findings of fact and conclusions and a recommendation. The public hearings will be held on November 15-19 and November 29-December 3, 2010. Evidentiary Hearings will be held on December 6, 2010 and will continue through December 17, 2010 as necessary.

Additional sessions may be provided if necessary to hear all interested parties wishing to testify. It is not necessary to attend more than one session to have your input heard and included in the record. All members of the public are welcome to attend any public hearing sessions.

FINAL EIS

After the comment period on the Draft EIS, the Office of Energy Security Energy Facility Permitting staff will prepare a Final EIS. The Final EIS will include revisions to the draft as well as staff responses to substantive comments on the draft. The Final EIS is scheduled to be completed by January 7, 2011, and included in the compiled record turned over to the PUC by the ALJ.

LIST OF PREPARERS/CONTRIBUTORS

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- HDR Engineering, Inc.
- Supplemental information not contained in the Applications was provided by the Applicant through NRG, Inc.

This document can be made available in alternative formats (voice/TTY) by contacting the Minnesota Relay Service at 711 or 1-800-627-3529.

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Acronym List

Acronym	Meaning
AC	alternating current
ACSS	Aluminum Conductor Steel Supported
ALJ	Administrative Law Judge
ATF	advisory task force
BMP	Best Management Practice
BWSR	Minnesota Board of Water and Soil Resources
CSAH	County-State Aid Highway
CWA	Clean Water Act of 1979
dB	Decibel
DEIS	Draft Environmental Impact Statement
ECS	Ecological Classification System
EIS	Environmental Impact Statement
EMF	electromagnetic fields
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HVTL	high-voltage transmission line
MCBS	Minnesota County Biological Survey
kV	kilovolts
MnDNR	Minnesota Department of Natural Resources
Mn/DOT	Minnesota Department of Transportation
MOU	Memorandum of Understanding
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NEV	neutral-to-earth voltage
NHIS	Natural Heritage Information System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
OES	Minnesota Office of Energy Security
OSA	Office of the State Archaeologist
PWI	Public Waters Inventory
RIM	Reinvest in Minnesota
ROW	Right-of-way
SF6	sulfur hexafluoride
SHPO	Minnesota State Historic Preservation Office
SNA	Scientific Natural Area
TH	Trunk Highway

Acronym	Meaning
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WCA	Wetland Conversation Act
WMA	Wildlife Management Area
WPA	Waterfowl Protection Area

SUMMARY

The project being analyzed in this Environmental Impact Statement (EIS) is one of five transmission projects proposed as part of the CapX2020 Transmission Initiative. CapX2020 is a joint initiative of 11 transmission-owning utilities in Minnesota, Wisconsin, and the surrounding region.

The proposed project consists of approximately 169 to 180 miles of 345 kV transmission line. The proposed 345 kV transmission line would be constructed primarily with single-pole self-weathering or galvanized steel structures, ranging in height from 130 to 175 feet, with a span length ranging from 600 to 1,000 feet between poles. The typical right-of-way (ROW) for the 345 kV transmission line would be 150 feet.

Under the Minnesota Power Plant Siting Act, a route may have a variable width of up to 1.25 miles. In this case, Great River Energy and Xcel Energy (Applicants) have requested a route width of 500 feet on each side of a preliminary centerline (1,000-foot total width) for most areas in order to allow them flexibility during final design. The maximum route width of 1.25 miles was requested in areas to accommodate site specific considerations and substation interconnection. As mentioned above the final ROW would generally be 150 feet. The Commission can and may limit a new power line to a more specific route in the permit in order to ensure predictability in ROW placement, the protection of sensitive areas, or in response to specific landowner concerns.

The OES reviewed and updated the information in the utility's route permit application, including house locations, numbers of houses within various distances from the routes, airport locations and potential conflicts, as well as natural resource data such as that on wetlands, rare species, and other information.

The OES has analyzed the two routes and five route options proposed by the Applicants. In addition, the OES has evaluated six routes that were identified by the Advisory Task Force (ATF). The OES has also analyzed 12 route options suggested by the public during the comment period and the five amended scope options submitted by the Applicants on June 29, 2010.

The OES has prepared this draft EIS for the proposed Project, consistent with the EIS Scoping Decision. A draft EIS comment period in concert with public information meetings will follow the release of this EIS. After the close of the comment period, the OES staff will prepare a final EIS based on public comments. The final EIS will include revisions to the draft as well as responses to substantive comments on the draft EIS.

The Commission will hold formal public hearings regarding the best route for the proposed line (Minn. Stat. 216E.03, subd. 6). The hearings, presided over by a state-appointed administrative law judge, are scheduled to occur November 15-19 and November 29- December 3, 2010. Interested persons will have an opportunity at the hearing to ask questions about the proposed Project and provide comments that will become part of the administrative record.

A variety of comments were received in writing either by mail or email, and oral comments were recorded at the public scoping meeting. The major issues raised are listed below:

- General Routing Issues
- Land Use
- Property Values
- Visual and Aesthetic Impacts
- Right of Way Acquisition
- Biological Issues
- Cultural Resources
- Health and Safety
- Suggested New Route Options
- Suggested New Routes
- Water Resources

The potential impacts of the various route options are analyzed for each major human or natural resource issue in Sections 5, 6 and 7.

This draft EIS covers the required environmental review of the Project and route permit application.

- **Section 1** describes the proposed Project, including location, route description, and right-of-way requirements.
- **Section 2** provides information about the regulatory framework for the Project, including permitting procedures, public scoping and review processes, and hearings before the Commission.
- **Section 3** describes the engineering and operation design for the proposed transmission line and associated facilities.
- **Section 4** provides information on the proposed construction and maintenance procedures.
- **Section 5** provides detail on the affected environment, potential impacts and mitigation on the Preferred Route, Route A, Route Options 1, 2,3 and the amended scope options 1,2 and 3 in the Fargo to Alexandria portion of the project.
- **Section 6** provides detail on the affected environment, potential impacts and mitigation on the Preferred Route, Route A, and Route Options 4, 5 and 7 in the Alexandria to Sauk Centre portion of the project.
- **Section 7** provides detail on the affected environment, potential impacts and mitigation on the Preferred Route, Routes A, B, C, D, E, F, G,H and Route Options 6, 8, 9, 10, 11, 12, in addition to, amended scope options 4 and 5 in the Sauk Centre to St Cloud portion.
- **Section 8** outlines the required permits and approvals for the proposed Project.
- **Section 9** provides the document's references.

IMPACT SUMMARY

The impact analysis of this EIS is divided into three geographic areas because of the size of the proposed project. The three areas are North Dakota to Alexandria, Alexandria to Sauk Centre, and Sauk Center to St Cloud. Summary tables describing the potential impacts of each of the proposed routes can be found in Appendices I, J and K. A summary of the key issues in each of the three areas is provided below. Please note that several route options were also analyzed; in general, these options were developed to avoid certain areas of development along the main routes. Details regarding the relative impacts of the route options compared to the main routes can be found in Chapters 5-7, and Appendices I, J, and K.

North Dakota to Alexandria

Two primary routes were analyzed in the North Dakota to Alexandria portion of the project; the Applicant Preferred Route and Route A. The Applicant Preferred Route generally follows Interstate 94 from the Minnesota/North Dakota border near Fargo to Alexandria. Route A follows various county and township roads and field lines from the Minnesota/North Dakota Border approximately five miles south of Breckenridge to Alexandria. Impacts for the North Dakota to Alexandria area are summarized below. The EIS also analyzed three route options and three amended scope options. The impact summary for these options can be found in Appendix I.

Human Settlement:

Human settlement impacts include those to socioeconomic resources, land use and zoning, displacement of homes and businesses, property values, pipelines, and noise. Generally, socioeconomic impacts would be similar for both routes. The Applicant Preferred Route would impact slightly less agricultural land, but would have greater impacts to commercial properties than Route A. No residential displacements would be anticipated for either route. Studies indicate that property value impacts are uncertain, and would be dependent on the unique circumstances associated with each property. The Applicant Preferred Route would cross three pipelines, while Route A would not cross any pipelines. No significant noise impacts are anticipated from either route.

Public Health and Safety:

Public health and safety impacts include the potential effects of electromagnetic fields (EMF), stray voltage, and potential effects on implantable medical devices. Electric and magnetic fields are anticipated to be below exposure guidelines for either route. Stray voltage would only occur where the transmission line is parallel to and above distribution lines; the final transmission line alignment would be developed to avoid this situation to the extent possible for either route. Impacts to implantable medical devices are unlikely, and if they did occur, would be temporary in nature.

Recreation and Aesthetic Resources:

Route A would impact fewer acres of parks, open space, and recreation areas than the Applicant Preferred Route. Both routes would cross several recreational trails, as well as the King of Trails

scenic byway. Aesthetic impacts would generally be similar for each route, as the setting and number of residential properties are similar.

Transportation:

Transportation related impacts associated with construction would be the same for both routes. Impacts to future roadway projects would be greater for the Applicant Preferred Route, since it parallels Interstate 94 for the majority of the route, and more future roadway projects are planned for Interstate 94 than other, less used roadways in the area. A greater number of airports are present near the Applicant Preferred Route than are near Route A.

Wireless Technologies:

Widespread significant impacts to television and radio are not anticipated as a result of the project; however there are a greater number of communication towers near the Applicant Preferred Route than Route A.

Archaeological and Historic Resources:

The Applicant Preferred Route contains a greater number of identified archaeological and historic resources than Route A; however, additional survey would be necessary to determine the presence of unidentified resources. This additional survey has been identified as a component of a mitigation approach for addressing impacts to archaeological and historic resources.

Land-Based Economies:

Land-based economies include agriculture, forestry, mining, and tourism. In the project area, the primary land-based economy is agriculture. The Applicant Preferred Route would impact more acres of agricultural land but would not impact center pivot irrigation systems. Route A would potentially affect one center pivot irrigation system. Route A would impact more acres of wooded land; however, no significant woodlands managed for timber harvest purposes were identified in the project area. The Applicant Preferred Route includes four aggregate resource areas; no aggregate mines were identified in Route A. No impacts to mining resources are anticipated. While there would be an aesthetic impact to the King of Trails scenic byway, the effect would be localized. Therefore no significant impacts to tourism are anticipated.

Water Resources:

Approximately two to five transmission line structures would be placed in wetlands along the Applicant Preferred Route and five transmission line structures would be placed in wetlands along Route A. The Applicant Preferred Route includes a greater number of perennial stream crossings, while Route A would cross a greater number of intermittent streams. Both routes would cross the Red River; the Applicant Preferred Route would cross the Red River in the relatively developed Fargo-Moorhead area; Route A would cross the Red River in a less developed area south of Breckenridge, Minnesota.

Natural Land Resources:

These resources include various state and federally managed wildlife lands, state and federally listed species, and significant wildlife habitat areas. Both routes would have similar impacts to

non-agricultural vegetation. The Applicant Preferred Route would have greater impacts to wildlife management areas, United States Fish and Wildlife Service easements, Minnesota Land Trust Conservation Easements, and Reinvest In Minnesota Easements. Route A would impact a greater acreage of Sites of Biodiversity Significance and Railroad Right of Way Prairies.

Air Quality:

No significant air quality impacts were identified for either route, with the exception of dust emissions associated with construction activities.

Alexandria to Sauk Center

The Applicant Preferred Route and Route A were also analyzed in the Alexandria to Sauk Center area of the project. The Applicant Preferred Route generally follows Interstate 94 in this area where as Route A follows several county and township roads. Impacts for the Alexandria to Sauk Center area are summarized below. The EIS also analyzed three route options and three amended scope options. The EIS also analyzed four route options. The impact summary for these areas can be found in Appendix J.

Human Settlement:

Generally, socioeconomic impacts would be similar for both routes. The Applicant Preferred Route would impact less agricultural land, but would have greater impacts to residential and commercial properties than Route A. No residential or commercial displacements would be anticipated for either route. Studies indicate that property value impacts are uncertain, and would be dependent on the unique circumstances associated with each property. The Applicant Preferred Route would include four pipeline crossings, while Route A would include five pipeline crossings. No significant noise impacts are anticipated from either route.

Public Health and Safety:

Electric and magnetic fields are anticipated to be below exposure guidelines for either route. Stray voltage would only occur where the transmission line is parallel to and above distribution lines; the final transmission line alignment would be developed to avoid this situation to the extent possible for either route. Impacts to implantable medical devices are unlikely, and if they did occur, would be temporary in nature.

Recreation and Aesthetic Resources:

Route A would impact fewer acres of parks, open space, and recreation areas than the Applicant Preferred Route. Both routes would cross recreational trails; however, the Applicant Preferred Route would cross and parallel the Lake Wobegon regional trail. Aesthetic impacts would generally be similar for each route, as the setting and number of residential properties are similar. However, the visual setting of the Lake Wobegon trail would be altered by construction of a transmission line along the Applicant Preferred Route.

Transportation:

Transportation related impacts associated with construction would be the same for both routes. Impacts to future roadway projects would be similar for both routes. Both routes would

potentially impact two airports in the area; the Applicant has met with the city of Sauk Center to discuss potential impact avoidance strategies.

Wireless Technologies:

Widespread significant impacts to television and radio are not anticipated as a result of the project; however there are a greater number of communication towers near the Applicant Preferred Route than Route A.

Archaeological and Historic Resources:

The Applicant Preferred Route contains a greater number of identified archaeological and historic resources than Route A; however, additional survey would be necessary to determine the presence of unidentified resources. This additional survey has been identified as a component of a mitigation approach for addressing impacts to archaeological and historic resources.

Land-Based Economies:

In the Alexandria to Sauk Center area, the primary land-based economy is agriculture. Route A would impact more acres of agricultural land and up to 11 center pivot irrigation systems. The Applicant Preferred Route would potentially affect one center pivot irrigation system. Route A would impact more acres of wooded land; however, no significant woodlands managed for timber harvest purposes were identified in the project area. No impacts to mining resources are anticipated. While there would be an aesthetic impact to the Lake Wobegon regional trail, the effect would be localized. Therefore, no significant impacts to tourism are anticipated.

Water Resources:

Approximately two to three transmission line structures would be placed in wetlands along the Applicant Preferred Route and fifteen transmission line structures would be placed in wetlands along Route A. The Applicant Preferred Route and Route A cross the same number of perennial streams, while Route A would cross a greater number of intermittent streams.

Natural Land Resources:

Route A would have greater impacts to non-agricultural vegetation than the Applicant Preferred Route. Route A would have greater impacts to wildlife management areas, United States Fish and Wildlife Service easements, and Sites of Biodiversity Significance.

Air Quality:

No significant air quality impacts were identified for either route, with the exception of dust emissions associated with construction activities.

Sauk Center to St. Cloud

There were nine routes analyzed in the Sauk Center to St. Cloud area of the project. These routes include the Applicant Preferred Route and Routes A, B, C, D, E, F, G and H. Of these routes, Route D follows Interstate 94; the other routes follow various other roadways, property lines, rail corridors, and field lines. A summary of potential impacts in the Sauk Center to St. Cloud area is provided below. The EIS also analyzed three route options, two amended scope

options and 13 miles of undergrounding along Route D. The impact summary for these areas can be found in Appendix I.

All of the routes would require placing transmission structures in wetlands. Any where from 18 to 30 transmission structures would be placed in wetlands depending on the route that is selected. There are no residences within 75 feet of Applicant Preferred Route or Routes A, B, E, G or H. Routes C, D and F have residences within 75 feet of the centerline.

Human Settlement:

Generally, socioeconomic impacts would be similar for all routes. The Applicant Preferred Route and Route A would impact the most agricultural land and would have the fewest residential impacts. Routes C, D, and F would have greater impacts on residential and commercial property. Routes C, D, and F would also likely require residential relocations, with up to nine relocations for Route D. Studies indicate that property value impacts are uncertain, and would be dependent on the unique circumstances associated with each property. Pipeline crossings would occur for the Applicant Preferred Route and Routes B, E, F, G, and H. No significant noise impacts are anticipated from any of the routes.

Public Health and Safety:

Electric and magnetic fields are anticipated to be below exposure guidelines for either route. Stray voltage would only occur where the transmission line is parallel to and above distribution lines; the final transmission line alignment would be developed to avoid this situation to the extent possible for either route. Impacts to implantable medical devices are unlikely, and if they did occur, would be temporary in nature.

Recreation and Aesthetic Resources:

Route F would have the greatest impact on parks, open space, and recreation areas; Routes A, G, and H would have the least impact on these resources. All routes would cross recreational trails; the Applicant Preferred Route would cross the Lake Wobegon regional trail twice and Route C would cross this trail three times. Route H does not cross the Lake Wobegon regional trail, but has the greatest overall number of trail crossings (eight). Aesthetic impacts would generally be similar for each route; however Routes B, D, and F would impact the greatest number of visual receptors.

Transportation:

Transportation related impacts associated with construction would be similar for all routes. Two roadway projects on Interstate 94 were identified; Routes B, C, and D would potential impact both projects, while the other Routes would only impact one of the roadway projects. No airport impacts are anticipated in the Sauk Center to St. Cloud area.

Wireless Technologies:

Widespread significant impacts to television and radio are not anticipated as a result of the project.

Archaeological and Historic Resources:

Additional survey would be necessary to determine the presence of unidentified resources in all routes between Sauk Center and St. Cloud. This additional survey has been identified as a component of a mitigation approach for addressing impacts to archaeological and historic resources.

Land-Based Economies:

In the Sauk Center to St. Cloud area, the primary land-based economy is agriculture. Impacts to agriculturally zoned lands would range from 77 acres for Routes D and F, to 97 acres for Routes B and G. Route H would impact the greatest number of center pivot irrigation systems (six). The Applicant Preferred Route and Route A would impact more acres of wooded land; however, no significant woodlands managed for timber harvest purposes were identified in the project area. Potential impacts to aggregate mining operations were identified for all routes except Route A. While there would be an aesthetic impact to the Lake Wobegon regional trail, the effect would be localized. Therefore, no significant impacts to tourism are anticipated.

Water Resources:

The Applicant Preferred Route would require the greatest number of poles in wetlands (30), followed by Route F (27) and Route C (24). All routes would require multiple stream crossings; Route A would have the greatest number of perennial stream crossings (17), while Route H would have the greatest number of intermittent stream crossings (43).

Natural Land Resources:

The Applicant Preferred Route would have greatest impact to non-agricultural vegetation, followed by Routes A, B, and C. Routes E and H would potentially impact a wildlife management area and Route B would impact a United States Fish and Wildlife Service easement. All routes would impact Sites of Biodiversity Significance with the exception of Route C. Routes B and F would potentially impact a Scientific and Natural Area, which is not permissible by law.

Air Quality:

No significant air quality impacts were identified for any of the routes, with the exception of dust emissions associated with construction activities.

1.0 PROJECT AND DOCUMENT INTRODUCTION

On October 1, 2009, Great River Energy and Xcel Energy (Applicants) submitted a route permit application to the Minnesota Public Utilities Commission (Commission) for a 345 kilovolt (kV) transmission line extending from the Red River along the Minnesota and North Dakota border (between Clay and Wilkin counties) to the new Quarry Substation (permitted in the Monticello to St Cloud EIS PUC Docket No. E002, ET2/TL-09-246) located west of St. Cloud, Minnesota (Project). The proposed transmission line would be approximately 169 to 180 miles long, depending on the final route selection. The application presented an Applicant Preferred route, five Applicant Preferred Route Options (which deviate from the Applicant Preferred Route) and Alternate Route A (Figure 1-1). The application was accepted as complete by the Commission on November 13, 2009.

Route permit applications for high voltage transmission lines are subject to environmental review in accordance with Minn. Rules 7850.1700 to 7850.2700 (full permitting process). Under the full permitting process the Commission has one year from the date the application was accepted as complete to make a decision on the route permit. As part of the decision making process, Office of Energy Security (OES) is required to develop an Environmental Impact Statement (EIS) that provides information about the extent of potential environmental impacts and how the potential impacts may be avoided or minimized.

The ATF recommended six additional route alternatives. The six ATF recommended routes were identified as:

- Group 1 Alternative 1, which specifically identified underground and above ground components
- Group 1 Alternative 2
- Group 2 Alternative 1
- Group 3 Alternative 1
- Group 3 Alternative 2
- Group 4 Alternative 1

These ATF routes are presented in Figure 1-2. The OES reviewed the ATF routes and made the determination that all of the ATF recommended routes be carried forward in the EIS for further evaluation.

The OES received several suggested route options through written comment during the comment period. These route options were evaluated, and the OES determined that 12 of the options be carried forward in the EIS (Figure 1-3).

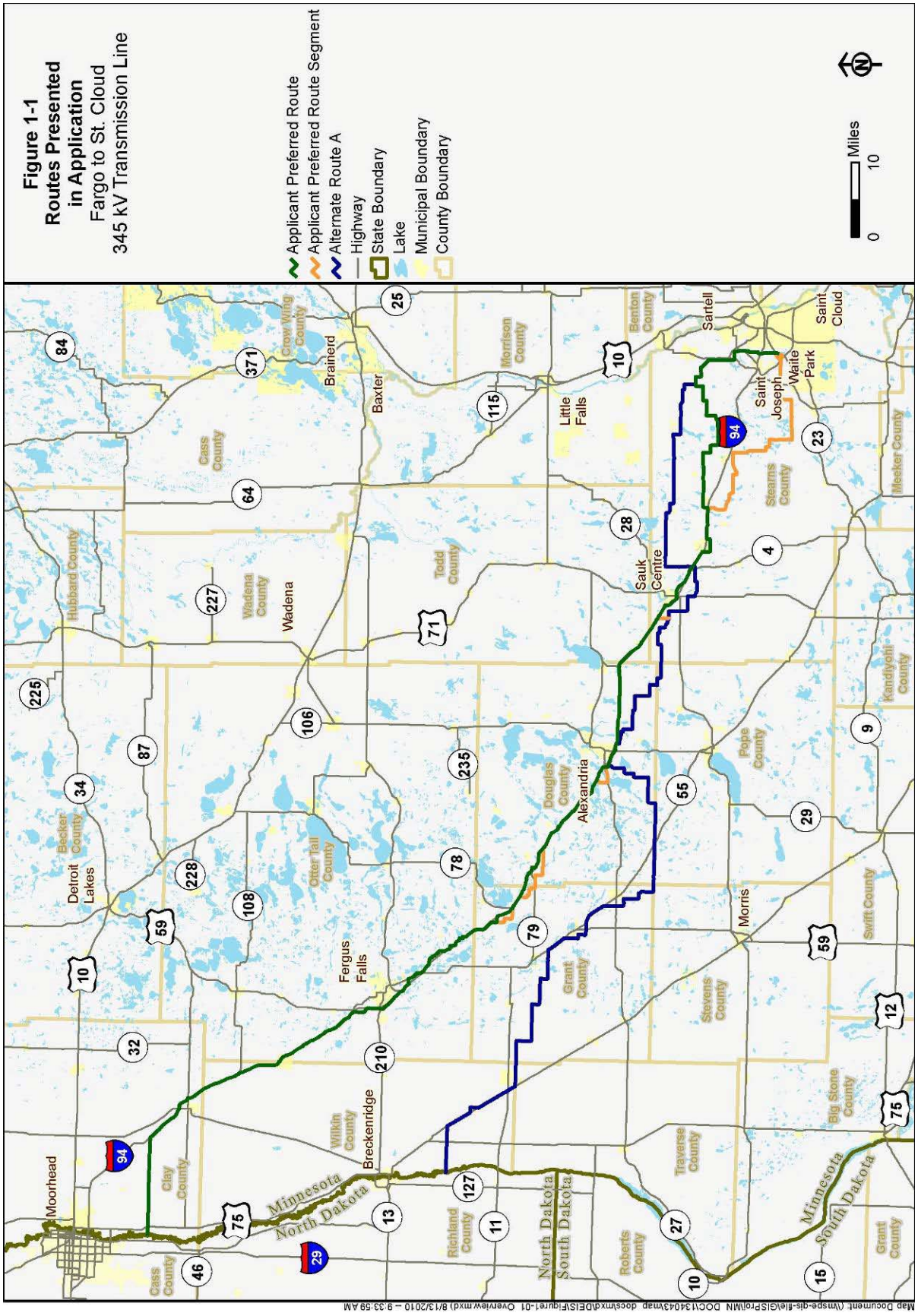
Figure 1-1
Routes Presented in Application
Fargo to St. Cloud
345 kV Transmission Line
Applicant Preferred Route
Applicant Preferred Route Segment
Alternate Route A
Highway
State Boundary
Lake
Municipal Boundary
County Boundary
0
10
Miles
Moorhead
Detroit Lakes
Fergus Falls
Breckenridge
Alexandria
Sauk Centre
Little Falls
Baxter
Brainerd
Wadena
Morris
Sartell
Saint Cloud
Saint Joseph
Waite Park
Minnesota
North Dakota
South Dakota
Clay County
Becker County
Hubbard County
Cass County
Wadena County
Todd County
Otter Tail County
Douglas County
Grant County
Wilkin County
Richland County
Roberts County
Traverse County
Stevens County
Pope County
Morrison County
Crow Wing County
Benton County
Stearns County
Meeker County
Kandiyohi County
Swift County
Big Stone County

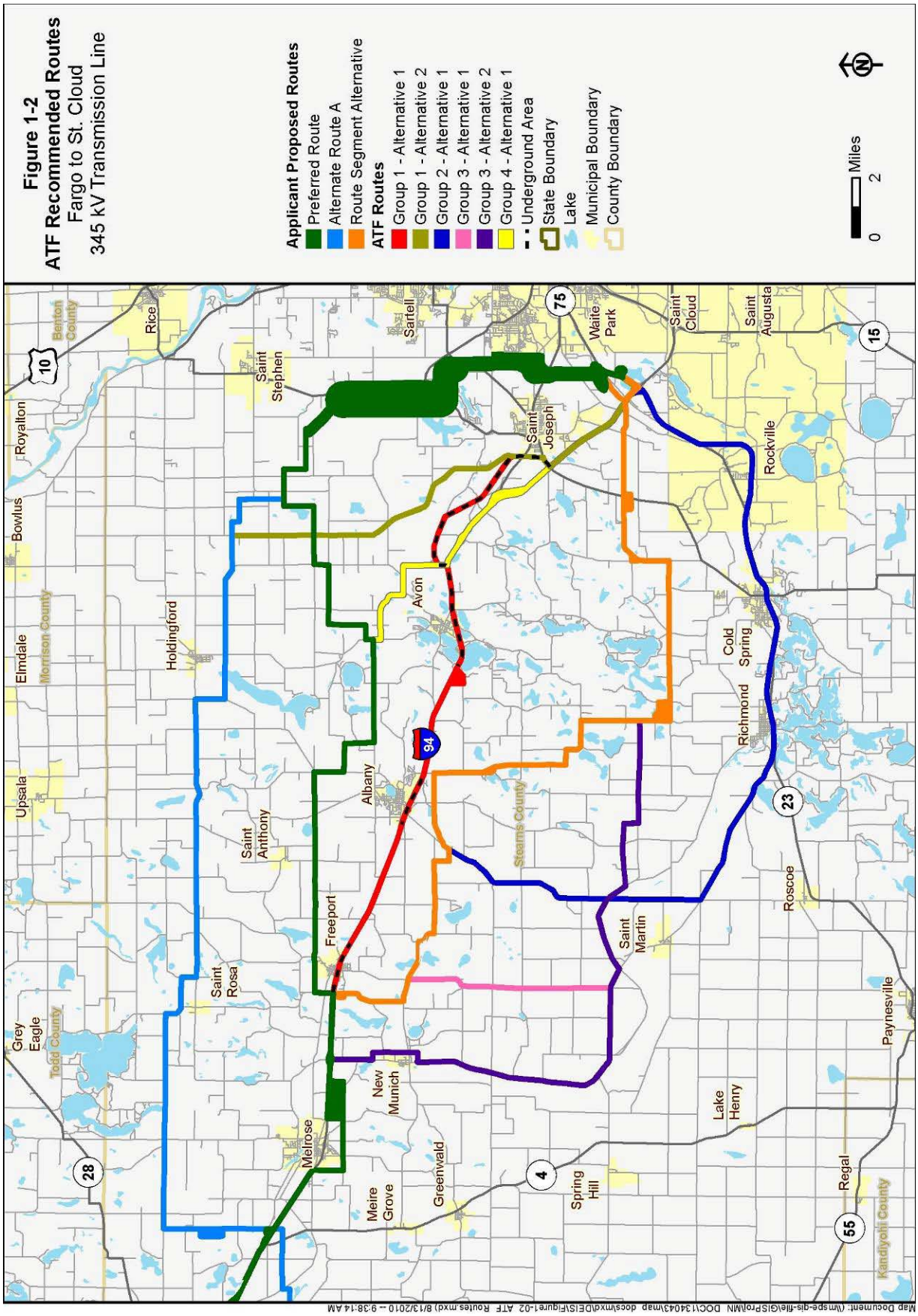
Figure 1-2
ATF Recommended Routes
Fargo to St. Cloud
345 kV Transmission Line
Applicant Proposed Routes
Preferred Route
Alternate Route A
Route Segment Alternative
ATF Routes
Group 1 - Alternative 1
Group 1 - Alternative 2
Group 2 - Alternative 1
Group 3 - Alternative 1
Group 3 - Alternative 2
Group 4 - Alternative 1
Underground Area
State Boundary
Lake
Municipal Boundary
County Boundary
0
2
Miles
Rice
Sartell
Waite Park
Saint Cloud
Saint Augusta
Saint Stephen
Saint Joseph
Rockville
Royalton
Bowlus
Elmdale
Morrison County
Holdingford
Avon
Cold Spring
Richmond
Upsala
Saint Anthony
Albany
Stearns County
Roscoe
Saint Martin
Freeport
Saint Rosa
Grey Eagle
Todd County
New Munich
Paynesville
Melrose
Lake Henry
Meire Grove
Greenwald
Spring Hill
Regal
Kandiyohi County
Benton County
10
75
15
94
23
28
4
55

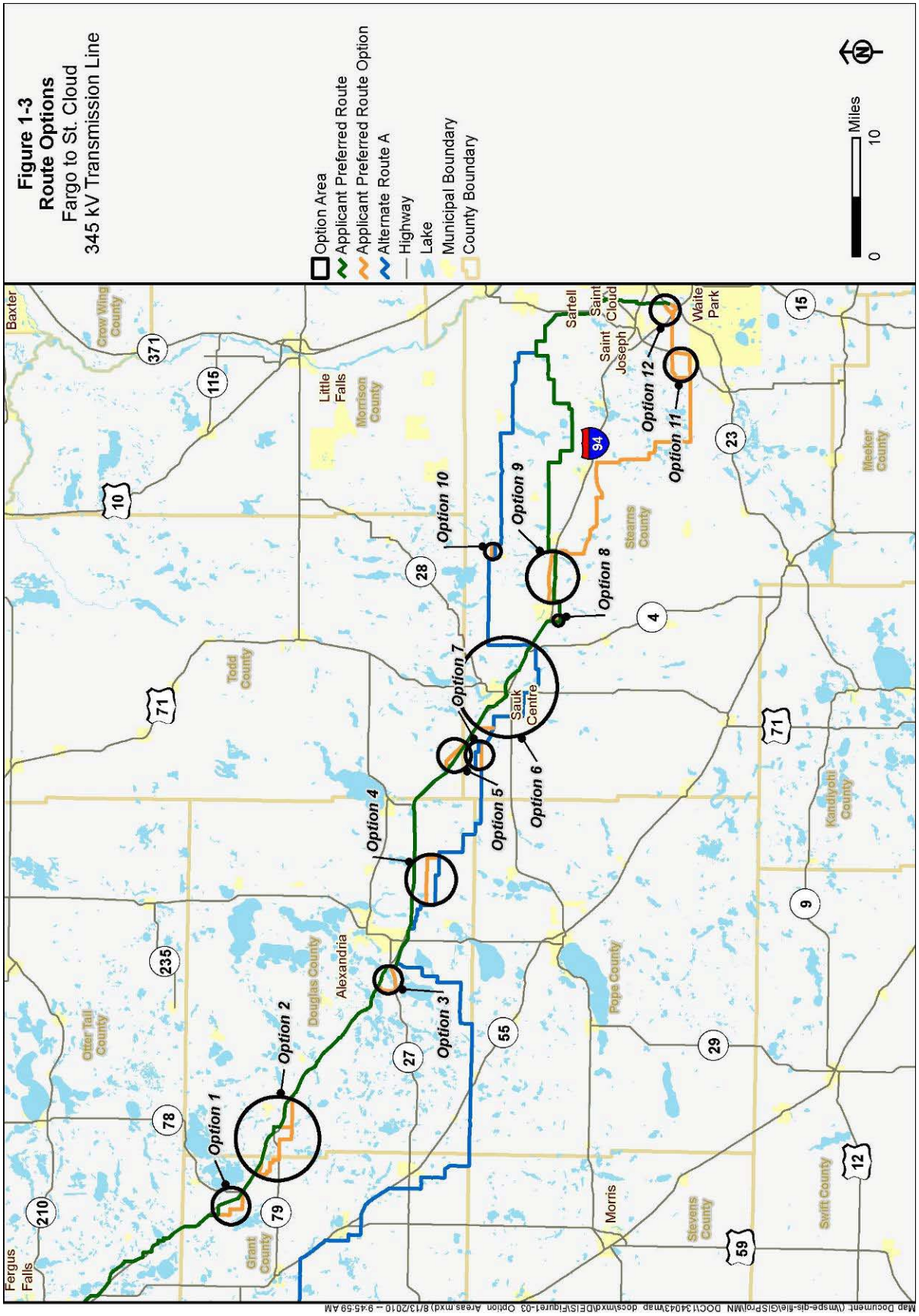
Figure 1-3
Route Options
Fargo to St. Cloud
345 kV Transmission Line
Option Area
Applicant Preferred Route
Applicant Preferred Route Option
Alternate Route A
Highway
Lake
Municipal Boundary
County Boundary
0
10
Miles
Option 1
Option 2
Option 3
Option 4
Option 5
Option 6
Option 7
Option 8
Option 9
Option 10
Option 11
Option 12
Fergus Falls
Baxter
Crow Wing County
Otter Tail County
Grant County
Douglas County
Alexandria
Todd County
Little Falls
Morrison County
Sauk Centre
Sartell
Saint Cloud
Saint Joseph
Waite Park
Stearns County
Pope County
Morris
Stevens County
Swift County
Kandiyohi County
Meeker County
94
371
115
10
71
235
78
210
79
27
28
55
4
29
59
9
12
23
15

A Scoping Decision Document was developed using comments submitted during the public notice period, comments documented through the public information meetings, and issues raised through the ATF meetings. Further detail regarding the selection of the route alternatives and route options selected for inclusion in the EIS can be found in the Scoping Decision Document located in Appendix A. The OES prepared this Draft EIS (DEIS) for the proposed Project, consistent with the EIS Scoping Decision which was signed by the Director of the Department of Commerce Office of Energy Security on April 15, 2010.

On June 29, 2010, the Applicants submitted a letter to OES requesting amendments to the scope of the EIS to include an analysis of additional alternatives. The additional alternatives proposed included three route options, expanding the Alexandria Switching Station area and a route width adjustment. The OES Director approved the change in scope to include these areas in the EIS analysis. The amended scope changes are shown in Figure 1-4. The Scoping Decision Amendment is attached in Appendix A.

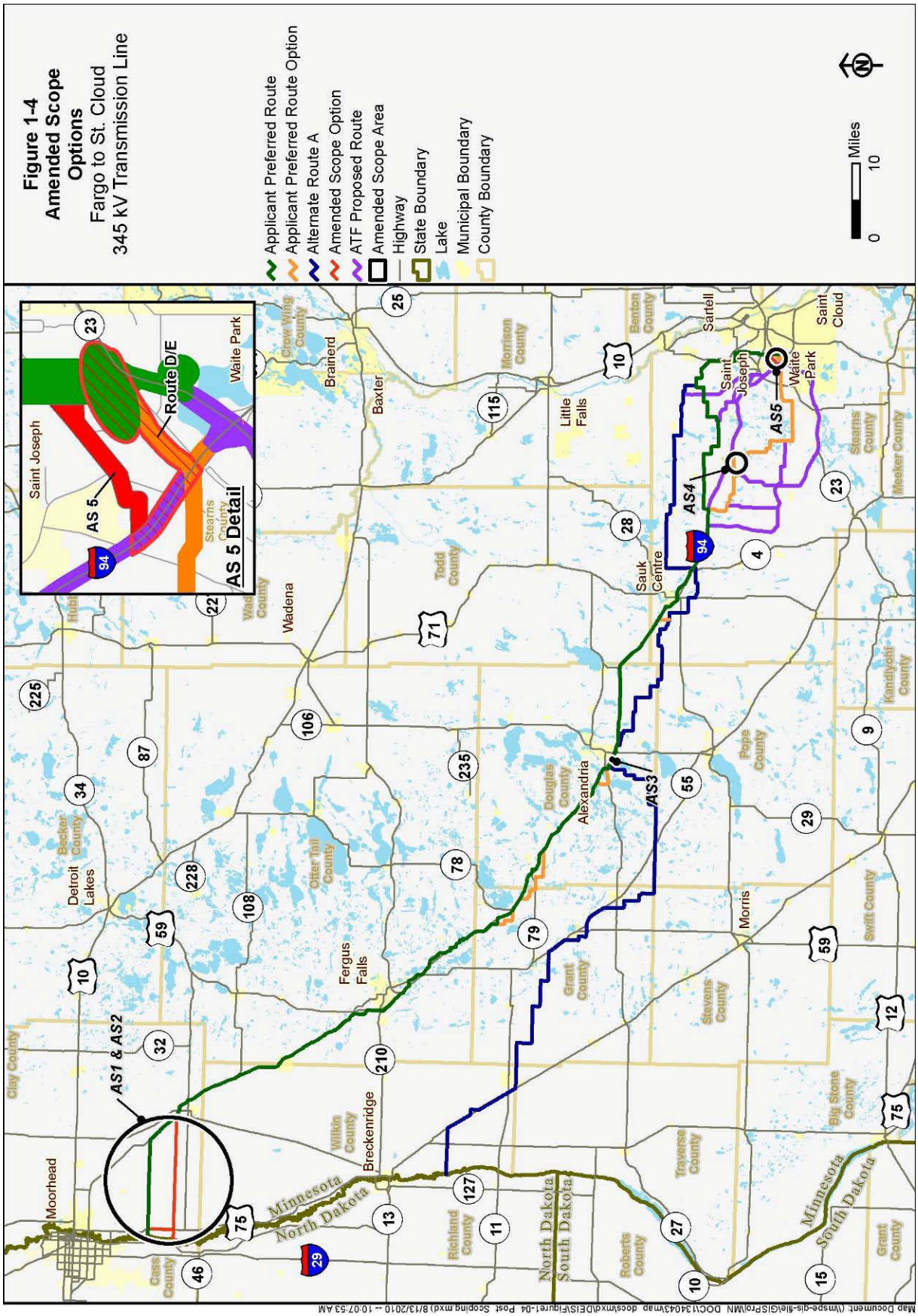
Figure 1-4
Amended Scope Options
Fargo to St. Cloud
345 kV Transmission Line
Applicant Preferred Route
Applicant Preferred Route Option
Alternate Route A
Amended Scope Option
ATF Proposed Route
Amended Scope Area
Highway
State Boundary
Lake
Municipal Boundary
County Boundary
0
10
Miles
AS 5 Detail
Saint Joseph
AS 5
Route D/E
Waite Park
Stearns County
AS1 & AS2
AS3
AS4
AS5
Moorhead
Cass County
Clay County
Detroit Lakes
Becker County
Hubbard
Wadena County
Wadena
Fergus Falls
Otter Tail County
Breckenridge
Wilkin County
Minnesota
North Dakota
South Dakota
Richland County
Alexandria
Douglas County
Grant County
Todd County
Morrison County
Brainerd
Crow Wing County
Baxter
Little Falls
Benton County
Sauk Centre
Sartell
Saint Cloud
Stearns County
Meeker County
Kandiyohi County
Pope County
Morris
Stevens County
Traverse County
Big Stone County
Swift County
Roberts County
Map Document: (\\mspe-gis-file\GISProj\MN DOC\134043\map docs\mxd\DEIS\Figure1-04 Post Scoping.mxd) 8/13/2010 -- 10:07:53 AM

1.1 PROJECT DESCRIPTION

The proposed Fargo to St. Cloud 345 kV Transmission Line Project would be approximately 169-180 miles long, extending from the North Dakota and Minnesota border in the Clay and Wilkins county area to the Quarry Substation west of St. Cloud, Minnesota.

According to the Applicant the proposed structures would primarily include single-pole, double circuit capable, self-weathering, or galvanized steel structures that would range in height between 130 and 175 feet. The span length between structures would typically range in length between 600 and 1,000 feet depending on site-specific considerations. Although the proposed line would be built using double circuit capable poles, only one circuit would be installed for this Project. The second position would be available for a future additional circuit. The ROW for the proposed 345 kV electrical transmission line would generally be 150 feet in width.

- Fargo to St. Cloud 345 kV transmission line – The proposed line would be constructed primarily on single-pole, double circuit capable, self-weathering, or galvanized steel structures. At this time, only one set of davit arms would be installed on the structures allowing current installation of a single circuit.
- Quarry Substation – Modifications would be made at the new Quarry Substation (permitted in the Monticello to St Cloud PUC Docket No. E002, ET2/TL-09-246) to accommodate the proposed 345 kV transmission line. These modifications would include the addition of 345 kV equipment (circuit breakers, switches, and control panels), foundations, and structures necessary to connect the line.
- Alexandria Switching Station – Modifications will be made at the existing Alexandria Switching Station to accommodate the proposed 345 kV transmission line. Equipment to be installed will include 345 and 115 kV equipment (including switches, a transformer, control panels, and circuit breakers), foundations, and structures. Some additional land will be required depending on ultimate configuration.

Applicants have identified two routes between the new Quarry Substation and the Red River: the Applicant Preferred Route and Alternate Route A. Applicants have also identified route options along the Applicant Preferred Route called the Applicant Preferred Route Options.

The Applicant Preferred Route Options range in length from approximately 1.5 to 46 miles. One of the route options, Applicant Preferred Route Option 2, provides for transition between the western portion of the Applicant Preferred Route and the eastern portion of Alternate Route A in the event there is interest in combining these route options. The other four Applicant Preferred Route Options (1, 3, 4, and 5) provide for deviations from the Applicant Preferred Route corridor where options associated with site-specific routing, permitting, or design considerations may be warranted.

1.2 PURPOSE OF THE TRANSMISSION LINE

The purpose of the Fargo to St Cloud 345 kV Project is to address local community reliability needs in the St. Cloud area, Alexandria, and the southern zone of the Red River Valley. The Fargo to St Cloud 345 kV Project will help improve the bulk electric system serving Minnesota

and portions of neighboring states. The new 345 kV line will facilitate additional generation development, including renewable generation, in eastern North Dakota and western Minnesota by providing additional transmission capacity between these regions and the major regional load centers of the St. Cloud and Twin Cities Metropolitan areas.

1.3 PROJECT LOCATION

The proposed Project is generally located between the city of St. Cloud in Stearns County and the Red River, which extends along the Minnesota and North Dakota border, particularly in Wilkin and Clay counties. Because of the extensive length of the transmission line corridor, the project area has been divided into three distinctive geographic areas in this EIS to effectively present the combination of routes and route options developed by the Applicants, the ATF, and the public. The three areas include the North Dakota to Alexandria area, the Alexandria to Sauk Centre area, and the Sauk Centre to St Cloud area. The following further defines these three geographic areas and provides the counties and townships that may be impacted.

1.3.1 North Dakota to Alexandria Substation

The North Dakota to Alexandria Substation project area is depicted in Figure 1-5; the project will be located in portions of Clay, Wilkin, Traverse, Otter Tail, Grant, Douglas, Stevens, and Pope counties. The EIS analysis for this area includes the Applicant Preferred Route (which would begin where the proposed transmission line crosses the Minnesota border near Fargo), Route A (which would begin where the transmission line crosses the Minnesota border approximately 5.5 miles south of Breckenridge), two amended scope options, and an additional 4.3 acres of land at the Alexandria Switching Station. There are also three route options that were analyzed in the North Dakota to Alexandria portion of the project; these route options are shown in Figure 1-3. The North Dakota border to Alexandria project area ends at the Alexandria Switching Station in Douglas County.

Routes in the North Dakota to Alexandria area potentially affect the 41 townships listed in Table 1.3-1 below.

Table 1.3-1. Potentially Affected Townships by county, North Dakota to Alexandria Area

County	Township	Township & Range	Sections
Clay	Holy Cross	137N-48W	4-5; 7-18
	Humboldt	137N-45W	17-20; 28-29; 32-34
	Barnesville	137N-46W	2-4; 7-11;13-18
	Alliance	137N-47W	10-18
	Elkton	138N-46W	28-34
	Elmwood	138N-47W	25-36
	Kurtz	138N-48W	25-36
Wilkin	Champion	130N-45W	7,17-20,28-29,33-36
	Campbell	130N-46W	1-2,12
	Brandrup*	131N-46W	15-22,26-27,35-36
	Brandrup*	131N-47W	13-16,21-24
	Tanberg	135N-45W	1-2,12-13,24-25
	Prairie View	136N-45W	4-5,9-10,15-16,22,26-27,35
Traverse	Tintah	129N-45W	1-4
Otter Tail	Trondhjem	135N-44W	30-32
	Oscar	134N-44W	4-5, 8-9, 15-16, 22-23, 26-27, 35-36
	Carlisle	133N-44W	1, 12
	Fergus Falls	133N-43W	6-8, 17-20, 29, 32
	Buse	132N-43W	4-6, 8-10, 14-15, 23-26, 36
	Dane Prairie	132N-42W	30-32
	Tumuli	131N-42W	4-5, 9-10, 15-16, 22-23, 25-26, 35-36
	St. Olaf	131N-41W	31
Grant	Lawrence	130N-44W	31-34
	Pomme de Terre	130N-42W	1, 12
	Pelican Lake	130N-41W	6-7, 17-21, 27-30, 32-35
	North Ottawa	129N-44W	3-6, 9-16
	Elbow Lake	129N-43W	7-9, 13-18, 20-25
	Sanford	129N-42W	19-22, 26-30, 34-36
	Erdahl	129N-41W	1-2; 11-13
	Lien	128N-42W	2, 11-14, 23-24
	Elk Lake	128N-41W	18-21, 28-29, 33-34
	Land	127N-41W	3-4, 9-11, 14-16, 22-23, 25-27, 35-36
Douglas	Evansville	129N-40W	5--9, 13-18, 20-24
	Brandon	129N-39W	19-20, 28-30, 32-34
	Moe	128N-39W	3-4, 10-13, 24
	La Grand	128N-38W	18-21, 26-29, 32-35
	Solem	127N-40W	31-36
	Holmes City	127N-39W	25-26, 31-36
	Lake Mary	127N-38W	3, 9-10, 15-16, 21-22, 28-33
Stevens	Swan Lake	126N-41W	1-2
Pope	Nora	126N-40W	1-6
	Ben Wade	126N-39W	1-6

** The political boundary of Brandrup Township includes two geographic townships.*

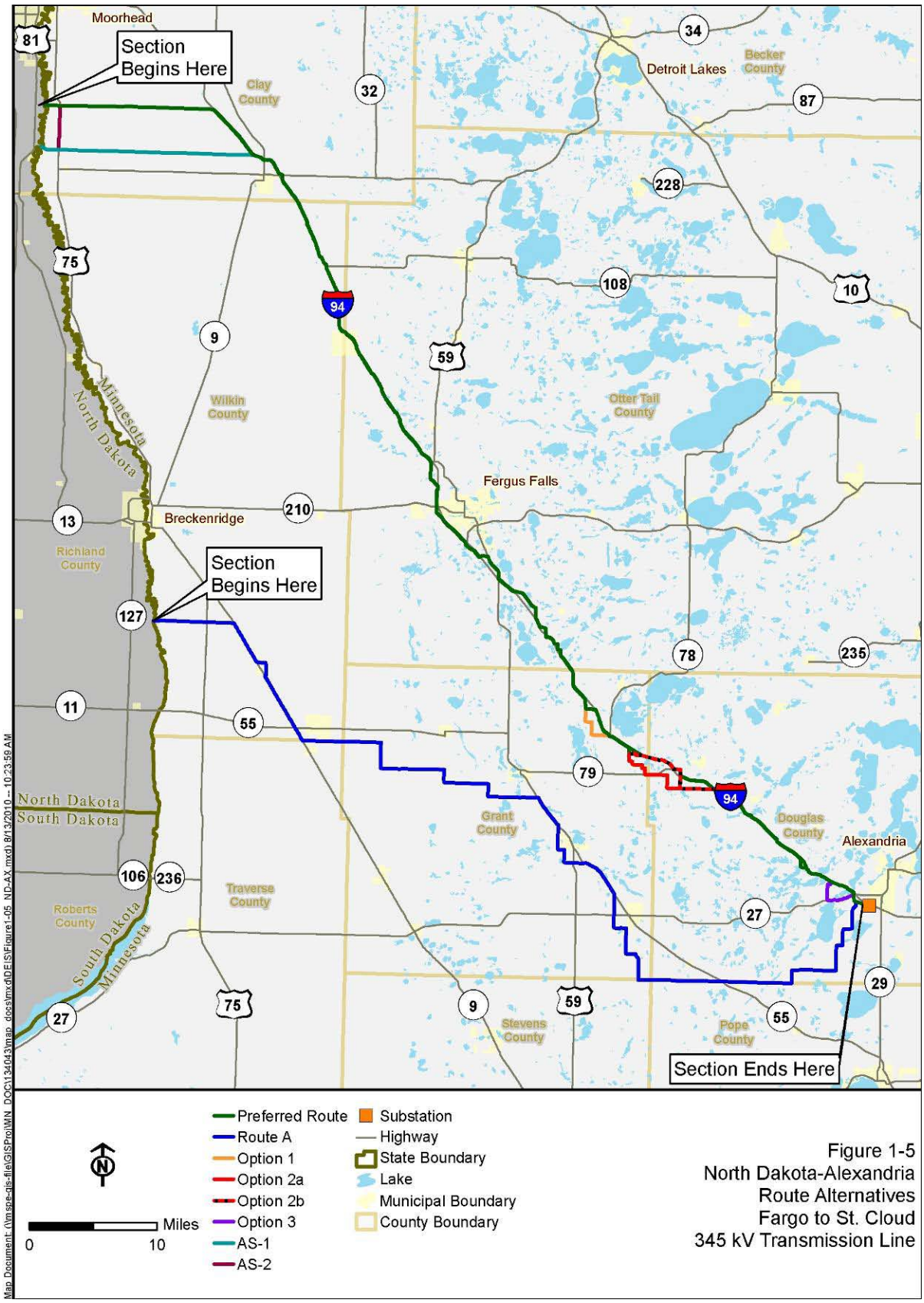

Figure 1-5
North Dakota-Alexandria
Route Alternatives
Fargo to St. Cloud
345 kV Transmission Line

1.3.2 Alexandria to Sauk Centre

The Alexandra to Sauk Centre project area is depicted in Figure 1-6; the project will be located in portions of Douglas, Pope, Todd, and Stearns counties. The EIS analysis for this area includes the Applicant Preferred Route and Route A (both begin at the Alexandria Substation) and four route options. The Alexandria to Sauk Center project ends just east of State Highway 4 in Stearns County.

The routes in the Alexandria to Sauk Centre area potentially affected 10 the townships listed in Table 1.3-2 below.

Table 1.3-2. Potentially Affected Townships, Alexandria to Sauk Centre Area

County	Township	Township & Range	Sections
Douglas	City of Alexandria	128N-37W	31
	City of Alexandria	128N-38W	36
	La Grand	128N-38W	36
	Lake Mary	127N-38W	1
	Hudson	127N-37W	1-16, 24
	Orange	127N-36W	1-12, 17-20, 27-30, 32-35
Pope	Westport	126N-36W	1-4
Todd	West Union	127N-35W	6-8, 17-18, 20-22, 26-28
Stearns	Ashley	126N-35W	1-6, 11-12, 33-36
	City of Sauk Centre	126N-34W	5-9, 14-30, 33-36
	City of Sauk Centre	127N-34W	31
	Melrose	126N-33W	29-32

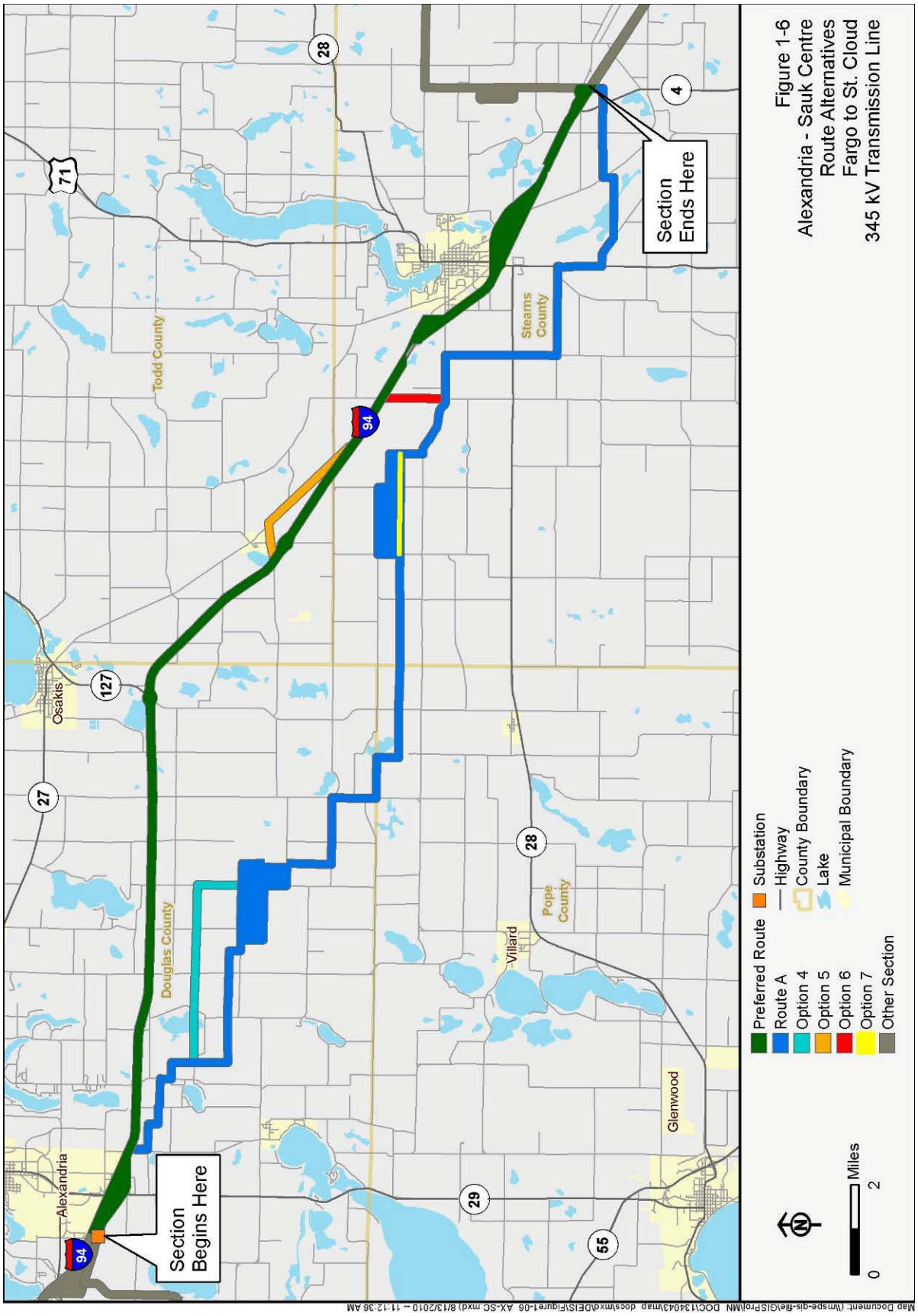

Figure 1-6
Alexandria - Sauk Centre
Route Alternatives
Fargo to St. Cloud
345 kV Transmission Line

1.3.3 Sauk Centre to St Cloud

The Sauk Centre to St Cloud project area is depicted in Figure 1-6; the project will be located in Stearns County. The EIS analysis for this area includes the Applicant Preferred Route and Routes A, B, C, D, E, F, G and H (all of these routes begin just east of State Highway 4 in Stearns County). The analysis also includes two amended scope options and five route options. The Sauk Center to St Cloud project would end at the new Quarry Substation. The potentially affected townships Routes analyzed in the Sauk Centre to St. Cloud area potentially affected the 23 townships listed in Table 1.3-3 below.

Table 1.3-3. Potentially Affected Townships, Sauk Centre to St. Cloud Area

County	Township	Township & Range	Sections
Stearns	Melrose City	126N-33W	34
	Melrose	126N-33W	1-12, 17-20, 29-33
	Millwood	126N-32W	4-15, 31, 33-36
	Krain	126N-31W	7-18, 31-35
	Holding	126N-30W	7, 14-25, 35-36
	Brockway	126N-29W	19-20, 28-34
	Melrose City	125N-33W	2-3
	Meire Grove City	125N-33W	1-4, 9-12
	Oak	125N-32W	1-12, 15-27, 30, 31, 34
	Albany	125N-31W	1-7, 10-14, 17-32, 34-35
	Avon	125N-30W	1-4, 7-10, 12-19, 22-33, 36
	St Wendel	125N-29W	1-3, 5-7, 10-15, 18-20, 22-33, 36
	Le Sauk	125N-28W	30-31
	Spring Hill	124N-33W	1, 12-13, 24
	St. Martin	124N-32W	3-6, 9-10, 13, 15-16, 19-30, 36
	Farming	124N-31W	2-3, 6-7, 10-11, 13-15, 18-19, 23-36
	Collegeville	124N-30W	25-26, 31-36
	St. Joseph	124N-29W	1, 4-6, 8-9, 11-17, 21-32, 34-35
	St. Cloud City	124N-28W	6
	Zion	123N-32W	1, 12
	Munson	123N-31W	1, 6-9, 15-17, 22-24
	Wakefield	123N-30W	1-6, 13-14, 19-23
	Rockville	123N-29W	3-6, 9-10, 15-18

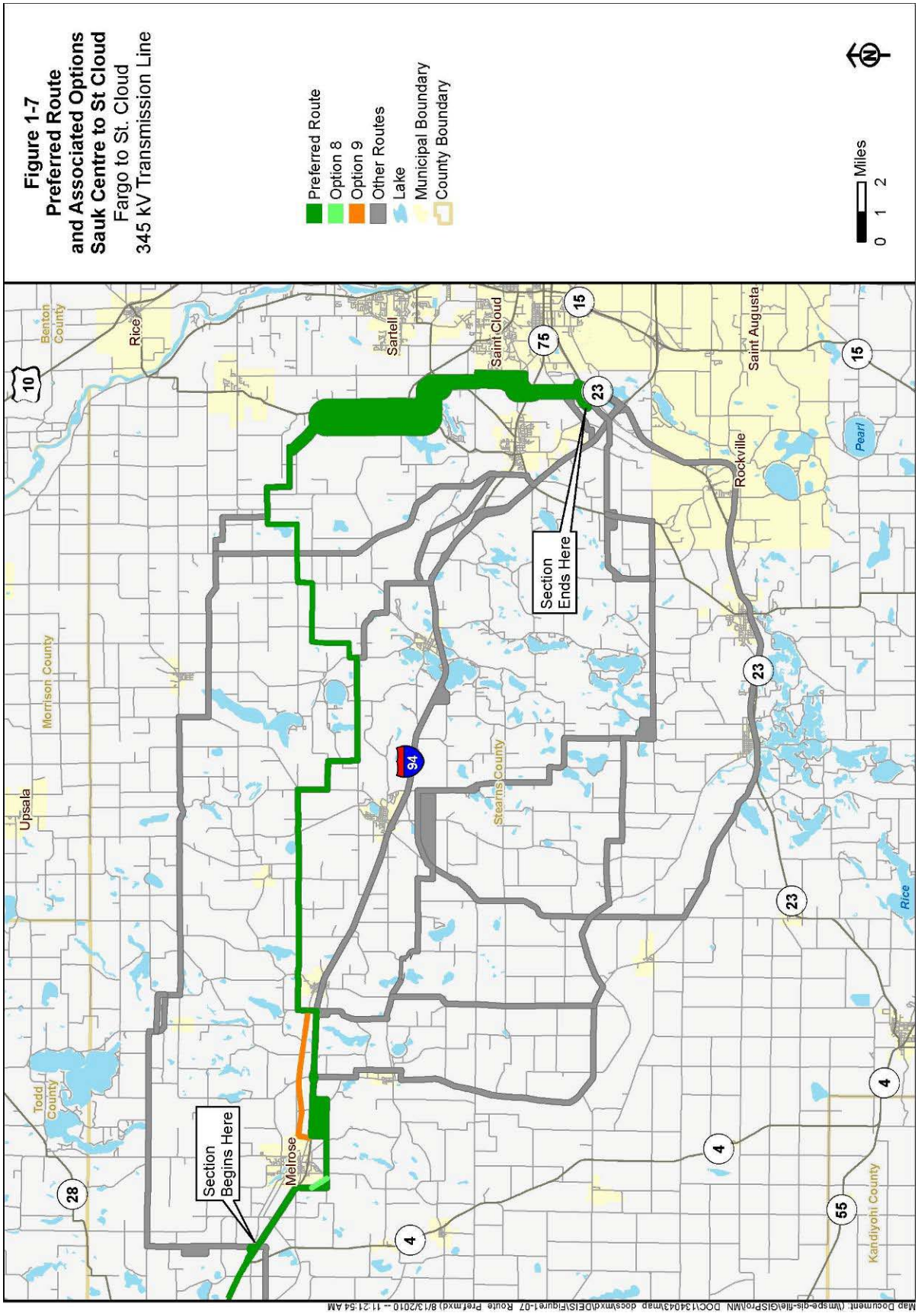
Figure 1-7
Preferred Route
and Associated Options
Sauk Centre to St Cloud
Fargo to St. Cloud
345 kV Transmission Line
Preferred Route
Option 8
Option 9
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Melrose
Sartell
Saint Cloud
Saint Augusta
Rockville
Rice
Upsala
Benton County
Morrison County
Todd County
Stearns County
Kandiyohi County
Pearl
Rice
10
28
4
55
94
75
15
23

1.4 ROUTE DESCRIPTIONS

Several routes and route options were identified by the Applicants, the public (through the scoping process), and the ATF. This EIS evaluates 9 routes and 12 route options. The following provides a summary of the routes and route options.

In the permit application, the Applicants identified two routes between the Minnesota/North Dakota border to the eastern terminus near St. Cloud, Minnesota. The Applicant Preferred Route begins near Fargo and terminates in St. Cloud, and the Applicant Alternate Route A which begins approximately 5.5 miles south of Breckenridge, Minnesota, and terminates in St. Cloud. Within the Applicant Preferred Route, the Applicants also identified five route options where relatively short route modifications were developed to avoid resources including wetlands and homes along the route.

The ATF was established by OES to identify local site or route impacts and issues of local concern and to identify alternative routes that would minimize or avoid negative impacts. The ATF process resulted in six additional route alternatives for the area between Freeport and St. Cloud. Additional route options, where relatively short route modifications were developed to avoid certain resources, were identified through comments received during the public comment period. Eight of these route options are evaluated in this EIS.

On June 29, 2010, the Applicants submitted an amendment to the original scope of the project which included three additional route options, expanding the Alexandria Switching Station area and adjusting the route width in the Albany area. Table 1.4-1 and Table 1.4-2 identify the routes and route options that are analyzed in this EIS, and designated name that will be used throughout this document.

Table 1.4-1. Alternative Routes to be Analyzed in the EIS

Routes Originated through the Permit Application or the ATF	Title in EIS
Applicant Preferred Route	Applicant Preferred Route
Applicant Alternate Route A	Route A
ATF Group 1 Alternative 2	Route B
ATF Group 4 Alternative 1	Route C
ATF Group Alternative 1 underground/above ground	Route D
Applicant Preferred Route Segment Alternate 1	Route E
ATF Group 2 Alternative 1	Route F
ATF Group 3 Alternative 1	Route G
ATF Group 3 Alternative 2	Route H

Table 1.4-2. Options to be Analyzed in the EIS

Option	Title in EIS
Options Proposed in Permit Application and through Public Comment Project	
Applicant Preferred Route Segment Alternative 5	Option 1
Applicant Preferred Route Alternative within Option 2	Option 2a
Applicant Preferred Route Segment Alternative 4	Option 2b
Applicant Preferred Route Segment Alternative 3	Option 3
Public Comment Segment	Option 4
Public Comment Segment	Option 5
Applicant Preferred Route Segment Alternative 2	Option 6
Public Comment Segment	Option 7
Public Comment Segment	Option 8
Public Comment Segment	Option 9
Public Comment Segment	Option 10
Public Comment Segment	Option 11
Segments developed to provide comparison in this area	Option 12
Options in the Amended Scoping Decision (AS), June 2010	
Applicant amended scope route option (east west segment by Red River)	AS-1
Applicant amended scope route option (north south segment by Red River)	AS-2
Applicant amended scope additional land at Alexandria Switching Station	AS-3
Applicant amended scope widened area on Route E	AS-4
Applicant amended scope route option into the Quarry Substation	AS-5

1.4.1 Routes

A brief description of the 9 routes, the 12 route options, and the amended scope areas is provided below. See Appendix B for a detailed description of the routes and options.

Applicant Preferred Route

The Applicant Preferred Route is approximately 180 miles in length and begins near Fargo, North Dakota. The proposed route travels in a southeasterly directions skirting the cities of Fergus Falls and Alexandria and paralleling I-94. Just west of Freeport the Applicant Preferred Route deviates from I-94 to the north and runs in a easterly direction until south of the city of Saint Stephen where it turns south and terminates at the new Quarry Substation (see PUC Docket No. E002, ET2/TL-09-246 for information about the new Quarry Substation).

Route A

Route A is approximately 169 miles in length and begins approximately 5.5 miles south of Breckenridge. The proposed route travels in a southeasterly direction following roads, field lines, railroads and existing transmission lines until the Alexandria area. At Alexandria, Route A follows an existing transmission line to the east until just south of Saint Stephen, where the route

turns south and follows the Applicant Preferred Route for 15.5 miles where it terminates at the new Quarry Substation (See Figure 1-8).

Route B

Route B begins just east of the intersection of State Highway 4 and I-94 and is approximately 46 miles long. The route follows Applicant Route A east until approximately 4.5 miles west of Saint Stephen where it would turn south for 17 miles (See Figure 1-9).

Route C

Route C begins just east of the intersection of State Highway 4 and I-94 and is approximately 40 miles long. The route follows the Applicant Preferred Route east until approximately 1.5 miles north of Avon where it turns to the southeast for 15 miles and then terminates at the new Quarry Substation (See Figure 1-10).

Route D

Route D begins just east of the intersection of State Highway 4 and I-94 and is approximately 38 miles long. The route follows the Applicant Preferred Route east along I-94 until approximately 0.5 miles west of Freeport where it deviates from the Applicant Preferred Route and runs southeast until a point approximately 0.25 miles northwest of St Joseph. At that point, the route turns south for 6.7 miles and then terminates at the new Quarry Substation (See Figure 1-11).

The ATF identified specific portions of Route D that could be constructed underground (at Freeport, Albany, and from Avon to St Joseph). Therefore, the analysis of Route D will include a more detailed discussion of impacts that may occur if these portions of the transmission line were constructed underground. As presented by the ATF, the proposed underground routes through Freeport and Albany are each approximately 1.5 miles long. At Avon, the route goes underground between Big Spunk Lake and Middle Spunk Lake and briefly turns northeast for approximately 3.5 miles, and then turns southeast again paralleling County Road 122 to skirt Collegeville and the western and southern city limits of St. Joseph. It rejoins the I-94 corridor south of St. Joseph and goes back above ground until terminating south of the city at the proposed Quarry Substation location in St. Joseph Township. The transmission line would be underground for approximately 10 miles from Avon to St. Joseph.

Route E

Route E begins just east of the intersection of State Highway 4 and I-94 and is approximately 44 miles long. Route E follows the Applicant Preferred Route until approximately 0.5 miles west of Freeport where it follows roads and property boundaries in a southeasterly direction for approximately 34 miles and terminates at the new Quarry Substation (See Figure 1-12).

Route F

Route F begins just east of the intersection of State Highway 4 and I-94 and is approximately 50 miles long. The route follows the Applicant Preferred Route until 0.5 miles west of Freeport where it deviates from the Applicant Preferred Route to Route E. The route would follow Route E for 3.2 miles south and then 5.3 miles east. At approximately 2 miles southwest of Albany the

route would deviate from Route E and travel south for 9 miles where it would turn east for 20 miles and then terminate at the new Quarry Substation (See Figure 1-13).

Route G

Route G begins just east of the intersection of State Highway 4 and I-94 and is approximately 44.5 miles long. The route follows the Applicant Preferred Route until 2.75 miles west of Freeport where it turns south on Route E for 3.3 miles. Then the route deviates from Route E and travels south for 7 miles where it turns east and travels approximately 24 miles where it terminates at the new Quarry Substation (See Figure 1-14).

Route H

Route H begins just east of the intersection of State Highway 4 and I-94 and is approximately 44 miles long. The route follows the Applicant Preferred Route until 2.75 miles west from Freeport where it travels south for 12 miles. The route follows Routes G and E for 14 miles where it terminates at the new Quarry Substation (See Figure 1-15).

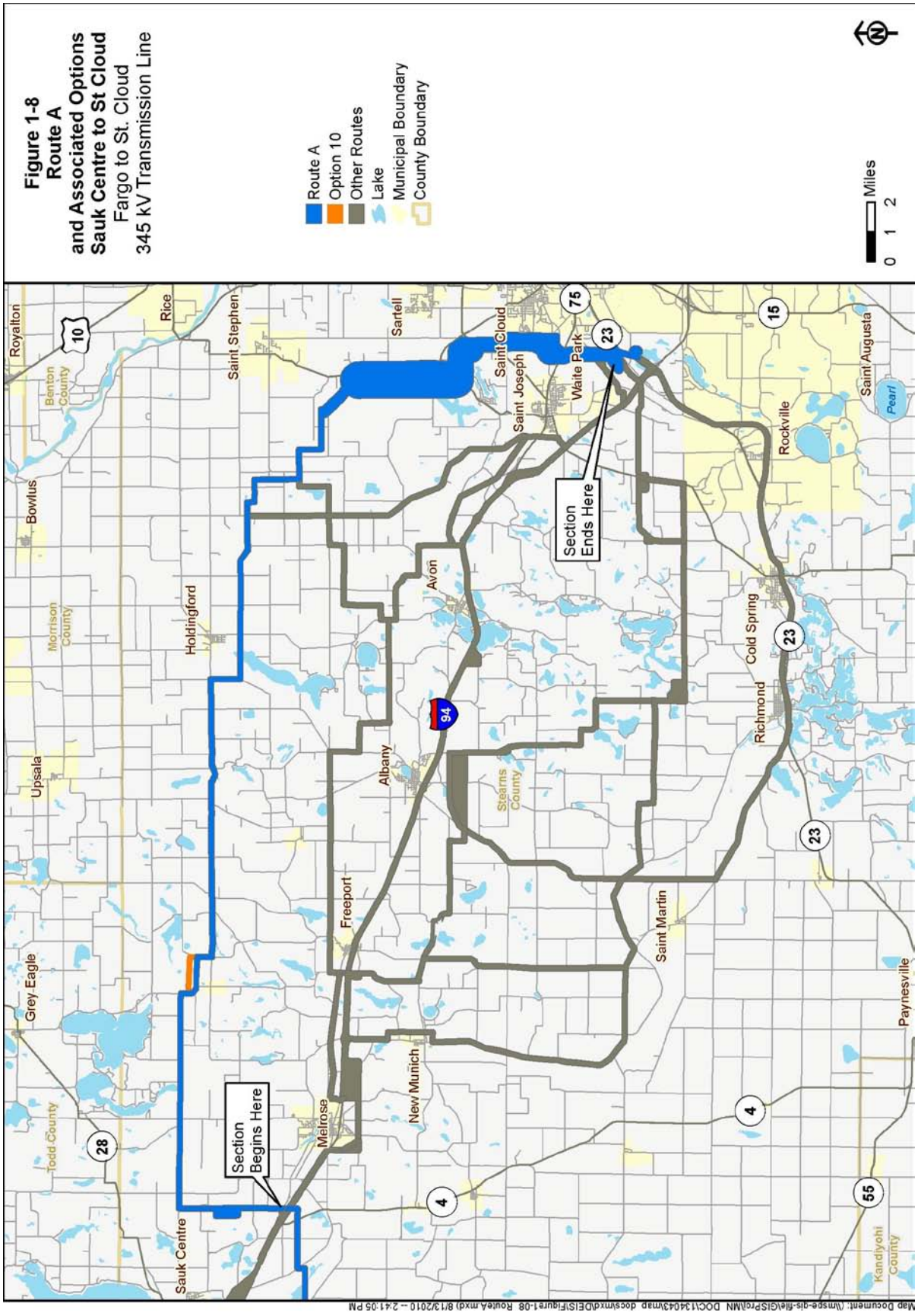
Figure 1-8
Route A
and Associated Options
Sauk Centre to St Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route A
Option 10
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Royalton
Rice
Saint Stephen
Sartell
Saint Cloud
Saint Joseph
Waite Park
Saint Augusta
Pearl
Rockville
Benton County
Bowlus
Section Ends Here
Avon
Holdingford
Morrison County
Cold Spring
Richmond
Upsala
Albany
Stearns County
Freeport
Saint Martin
Grey Eagle
Paynesville
New Munich
Section Begins Here
Melrose
Todd County
Sauk Centre
Kandiyohi County
10
75
23
15
94
28
4
55

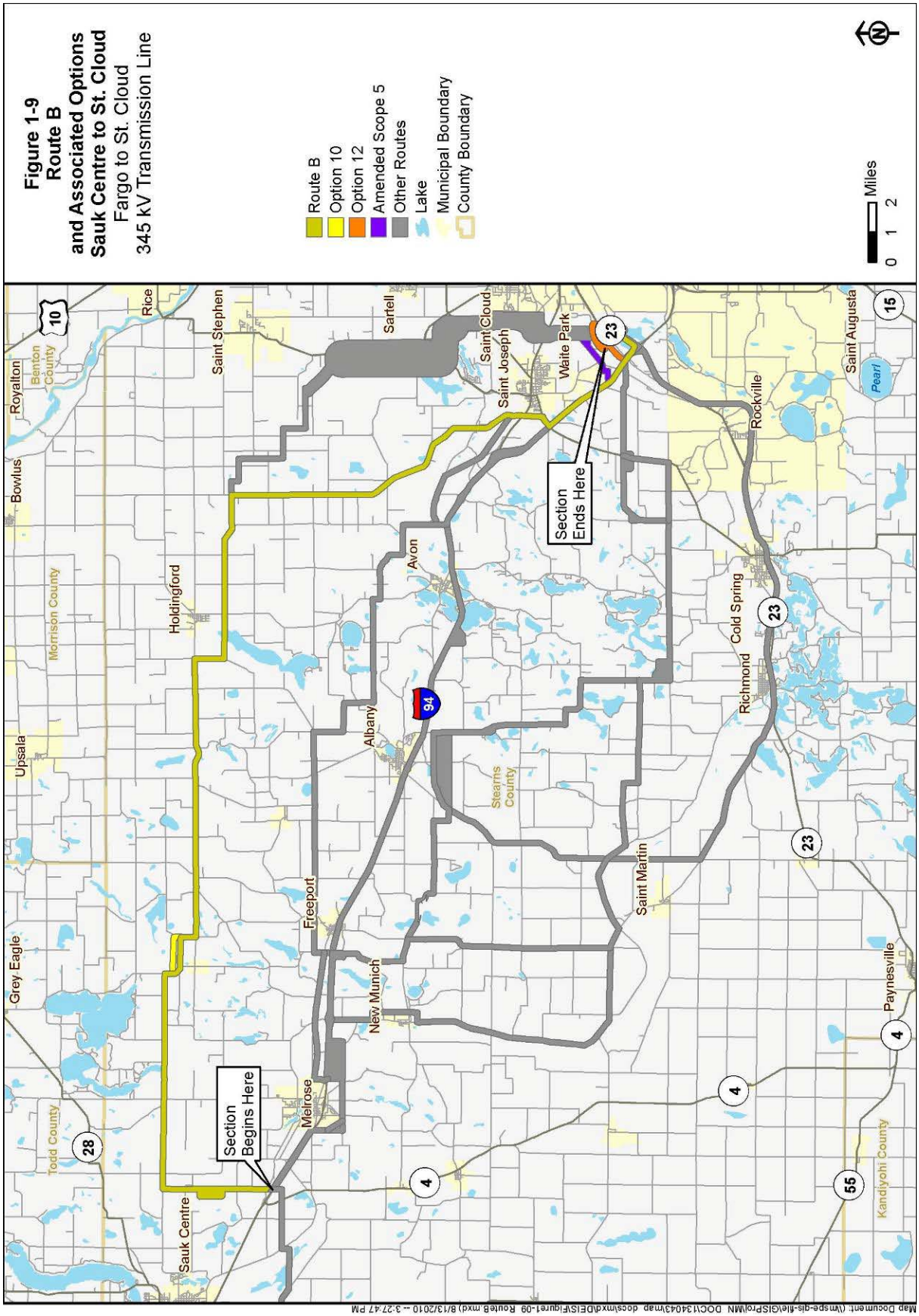
Figure 1-9
Route B
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route B
Option 10
Option 12
Amended Scope 5
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Sauk Centre
Melrose
Freeport
New Munich
Albany
Avon
Holdingford
Saint Stephen
Rice
Sartell
Saint Cloud
Saint Joseph
Waite Park
Rockville
Saint Augusta
Pearl
Cold Spring
Richmond
Saint Martin
Paynesville
Royalton
Bowlus
Upsala
Grey Eagle
Benton County
Morrison County
Todd County
Stearns County
Kandiyohi County
10
28
4
94
23
15
55

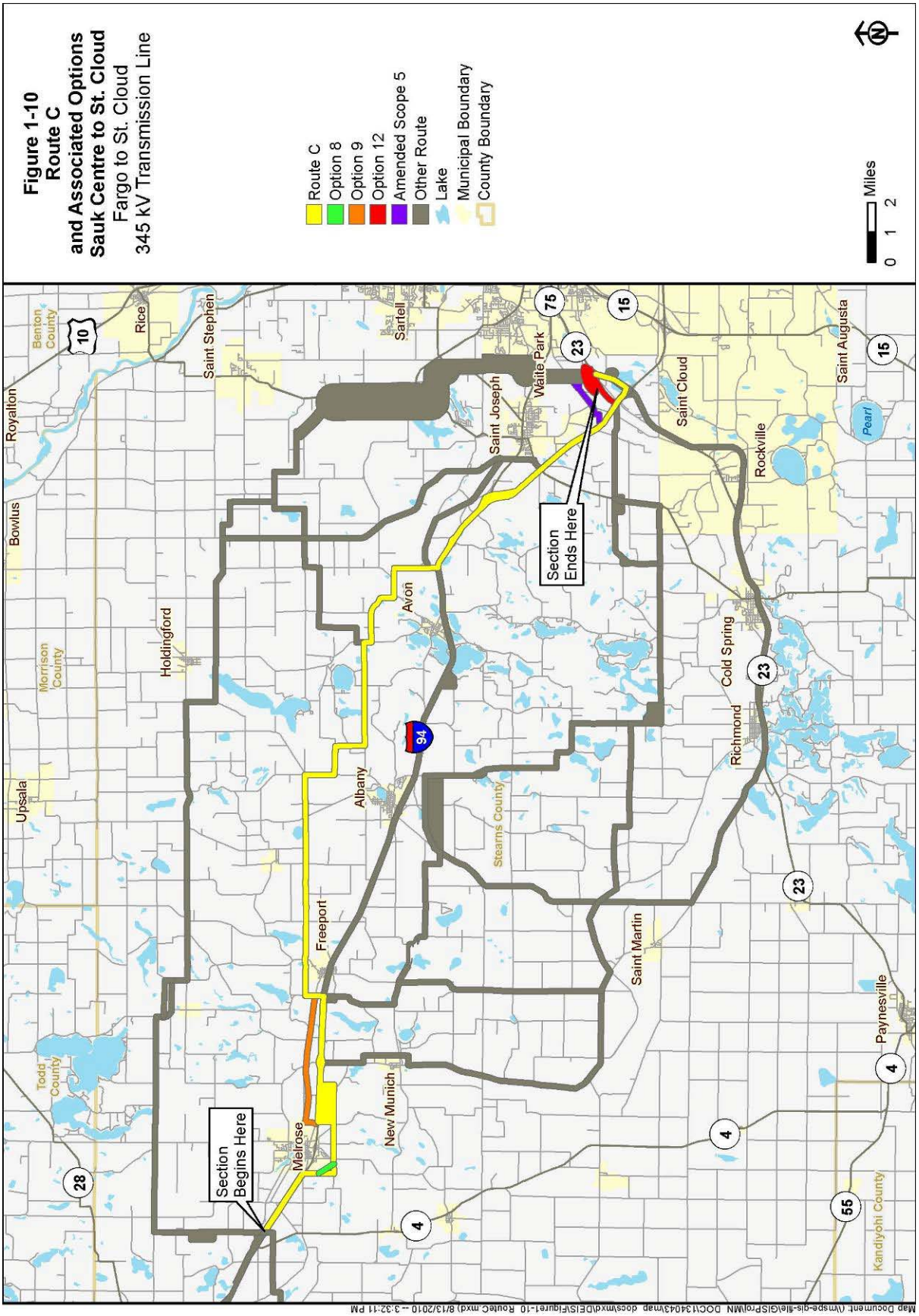
Figure 1-10
Route C
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route C
Option 8
Option 9
Option 12
Amended Scope 5
Other Route
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Royalton
Bowlus
Upsala
Rice
Saint Stephen
Sartell
Saint Joseph
Waite Park
Saint Cloud
Saint Augusta
Rockville
Cold Spring
Richmond
Paynesville
Saint Martin
Stearns County
Albany
Avon
Holdingford
Freeport
Melrose
New Munich
Benton County
Morrison County
Todd County
Kandiyohi County
Pearl
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94
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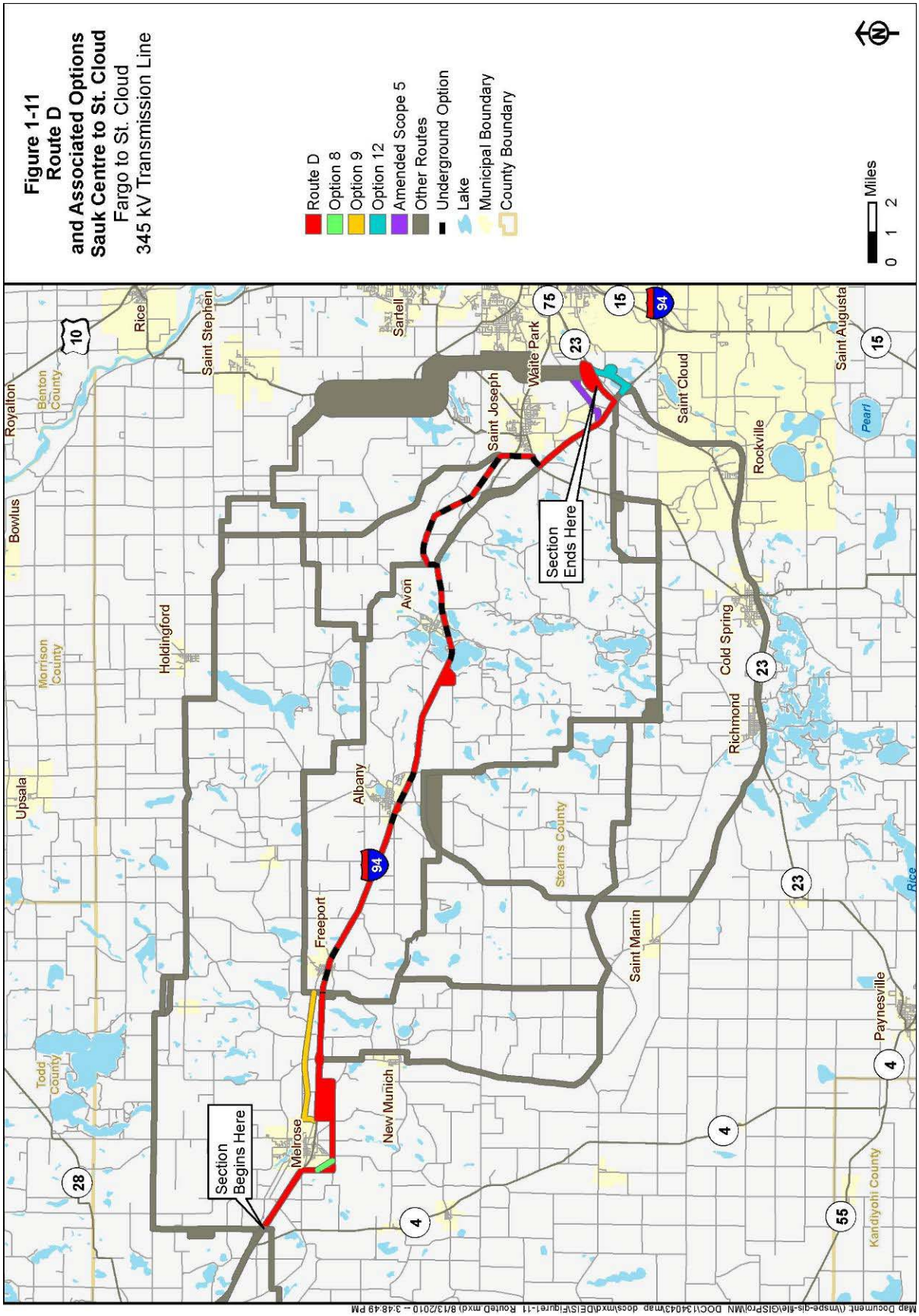
Figure 1-11
Route D
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route D
Option 8
Option 9
Option 12
Amended Scope 5
Other Routes
Underground Option
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Royalton
Benton County
Bowlus
Rice
Saint Stephen
Sartell
Waite Park
Saint Joseph
Saint Cloud
Saint Augusta
Pearl
Rockville
Morrison County
Holdingford
Avon
Cold Spring
Richmond
Upsala
Albany
Stearns County
Freeport
Saint Martin
Rice
Paynesville
Todd County
New Munich
Melrose
Kandiyohi County
10
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94
75
15
23

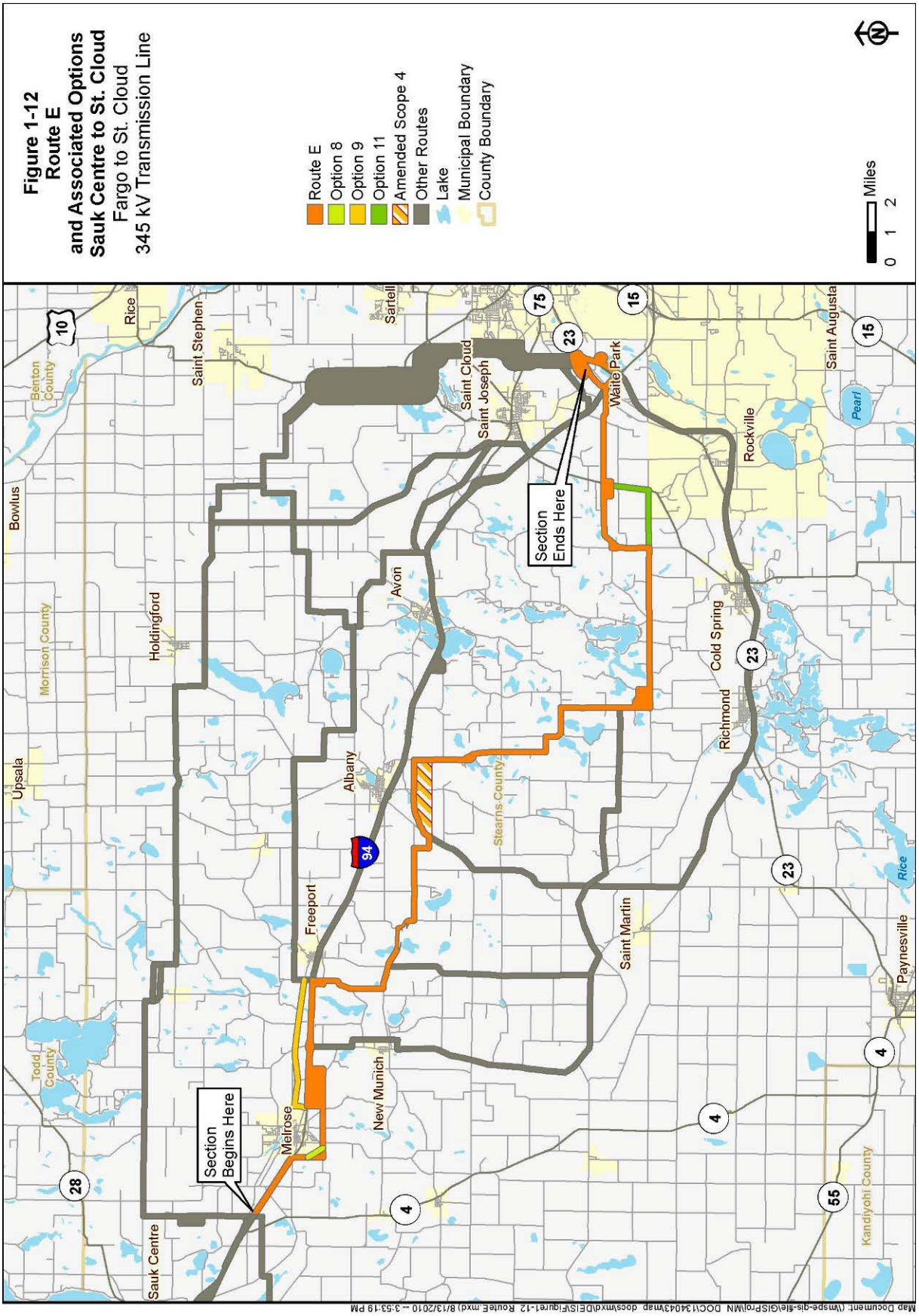
Figure 1-12
Route E
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route E
Option 8
Option 9
Option 11
Amended Scope 4
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Sauk Centre
Melrose
Freeport
Albany
New Munich
Avon
Holdingford
Saint Stephen
Rice
Sartell
Saint Cloud
Saint Joseph
Waite Park
Rockville
Saint Augusta
Cold Spring
Richmond
Saint Martin
Paynesville
Upsala
Bowlus
Benton County
Morrison County
Todd County
Stearns County
Kandiyohi County
Pearl
Rice
10
28
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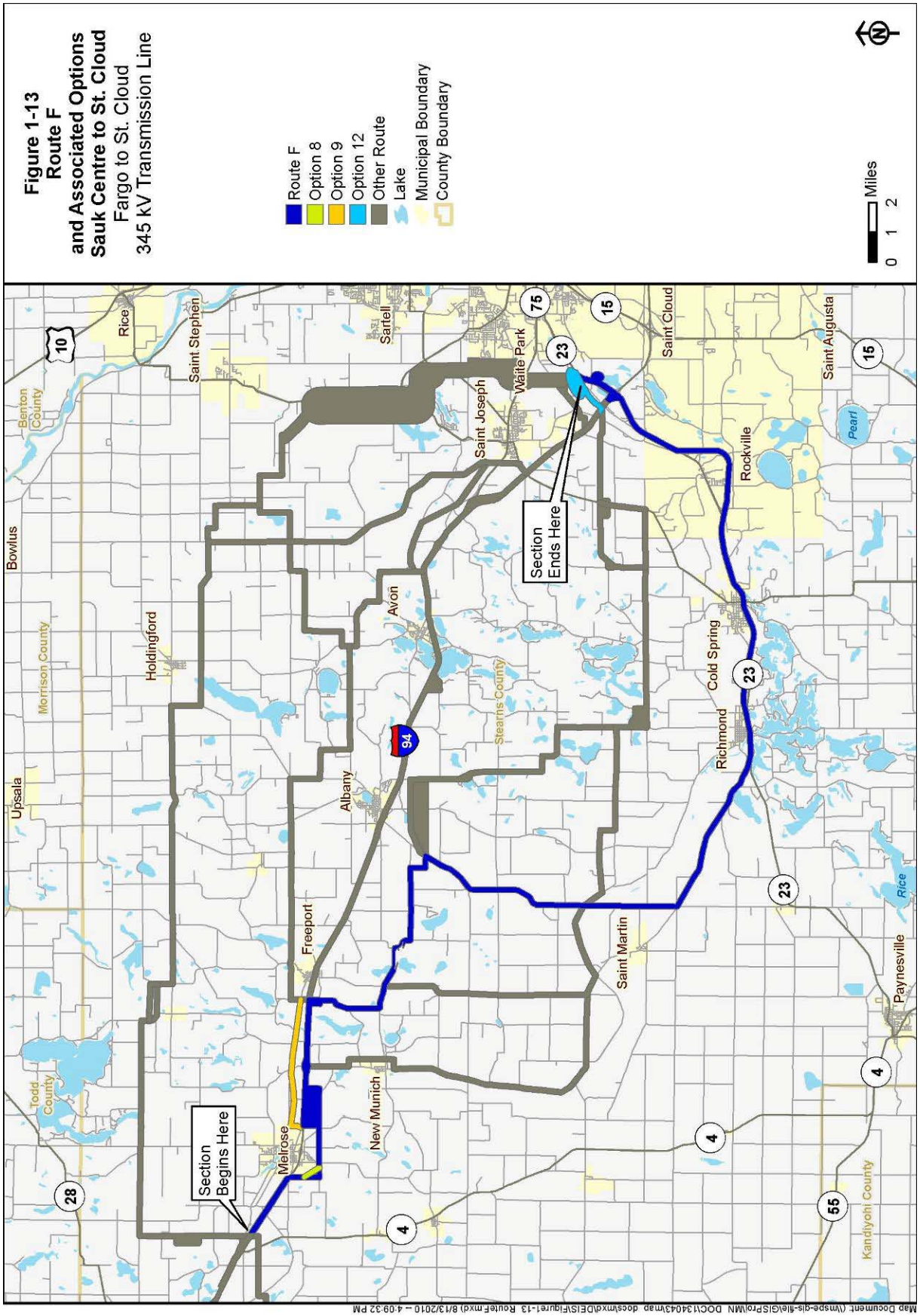


Figure 1-13
Route F
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route F
Option 8
Option 9
Option 12
Other Route
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Rice
Saint Stephen
Sartell
Waite Park
Saint Joseph
Saint Cloud
Saint Augusta
Pearl
Rockville
Cold Spring
Richmond
Rice
Paynesville
Saint Martin
Albany
Avon
Holdingford
Freeport
Melrose
New Munich
Bowlus
Upsala
Benton County
Morrison County
Todd County
Stearns County
Kandiyohi County
10
28
4
94
75
23
15
55

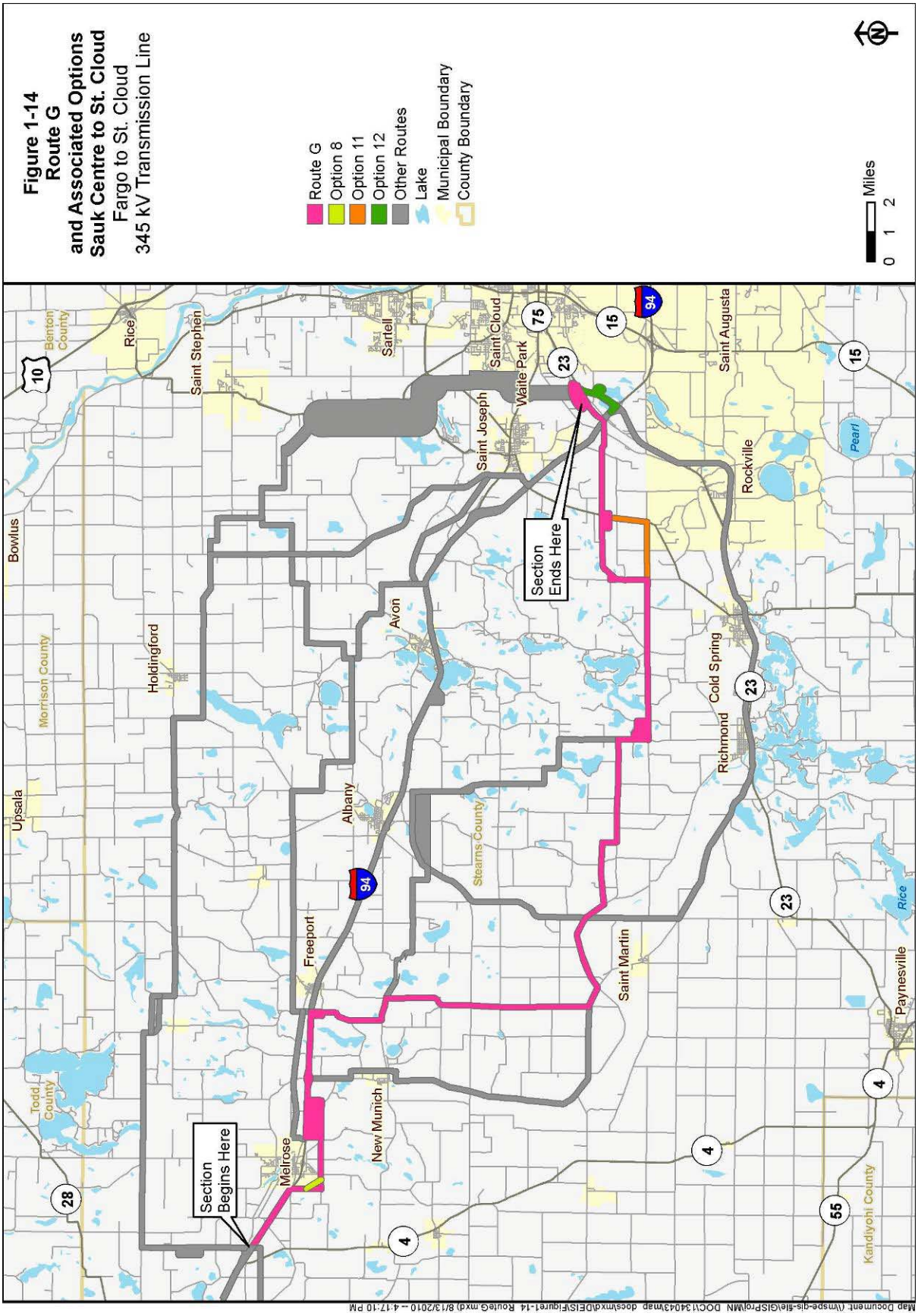


Figure 1-14
Route G
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route G
Option 8
Option 11
Option 12
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Benton County
Morrison County
Todd County
Stearns County
Kandiyohi County
Bowlus
Upsala
Rice
Saint Stephen
Sartell
Saint Cloud
Waite Park
Saint Joseph
Saint Augusta
Rockville
Pearl
Holdingford
Avon
Albany
Freeport
Melrose
New Munich
Cold Spring
Richmond
Saint Martin
Paynesville
Rice
10
28
4
55
75
15
94
23

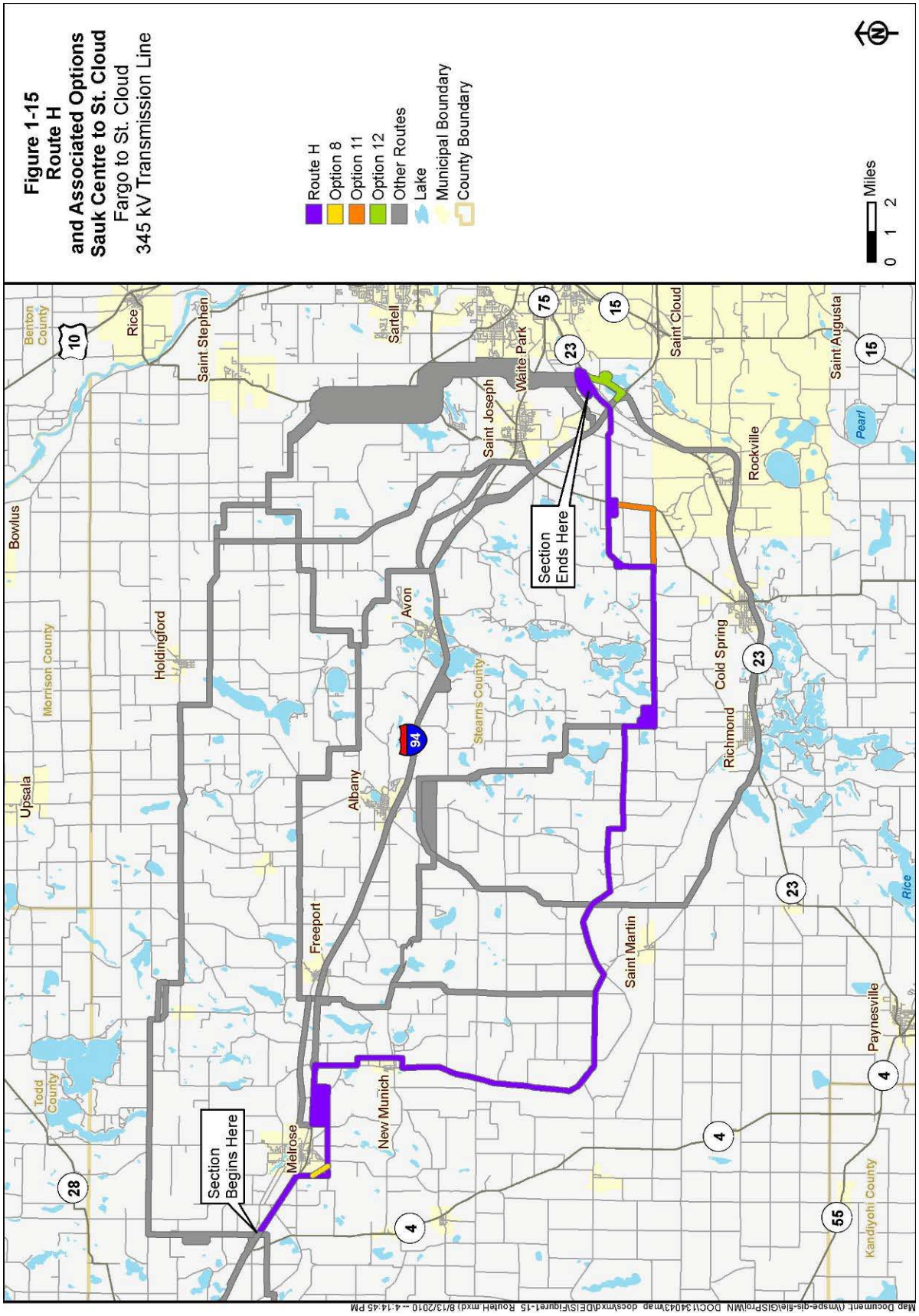


Figure 1-15
Route H
and Associated Options
Sauk Centre to St. Cloud
Fargo to St. Cloud
345 kV Transmission Line
Route H
Option 8
Option 11
Option 12
Other Routes
Lake
Municipal Boundary
County Boundary
Miles
0 1 2
Section Begins Here
Section Ends Here
Benton County
Rice
Saint Stephen
Sartell
Waite Park
Saint Joseph
Saint Cloud
Saint Augusta
Pearl
Rockville
Bowlus
Holdingford
Morrison County
Avon
Stearns County
Cold Spring
Richmond
Upsala
Albany
Freeport
Saint Martin
Rice
Paynesville
Todd County
Melrose
New Munich
Kandiyohi County
Map Document: (\\mspe-gis-file\GISProj\MN DOC\13404\Map docs\mxd\DEIS\Figure1-15 Routes H.mxd) 8/13/2010 -- 4:14:45 PM

1.4.2 Route Options

Option 1

Option 1 is approximately 4 miles in length and deviates from the Applicant Preferred Route (Figure 1-5) about 3 miles southwest of Ashby.

Route Options Option 2a and 2b

Option 2a is approximately 9 miles in length and deviates from the Applicant Preferred Route about 5 miles west of Evansville (Figure 1-5).

Option 2b is approximately 8.6 miles in length and is an alternative connection between the Applicant Preferred Route and Alternate Route about 8.5 miles southwest of Evansville (Figure 1-5).

Option 3

Option 3 is approximately 4 miles in length and deviates from the Applicant Preferred Route about 3 miles west of Alexandria. (Figure 1-5).

Option 4

Option 4 is approximately 5 miles long and deviates from Route A about 2 miles northeast of Forada (Figure 1-6).

Option 5

Option 5 is approximately 3 miles long and it slightly deviates from the Applicant Preferred Route just south of West Union (Figure 1-6).

Option 6

Option 6 is approximately 1.5 miles long (Figure 1-6). Option 6 allows for a transition between the Preferred Route and Alternate Route A about 2 miles west of Sauk Centre so that the west and east sections of the routes can be combined to form new routes in the route selection process.

Option 7

Option 7 is approximately 2 miles long and slightly deviates from Alternate Route A about 5 miles west of Sauk Centre.

Option 8

Option 8 is approximately 0.5 mile long and deviates from the Applicant Preferred Route just southwest of Melrose (Figure 1-10).

Option 9

Option 9 is approximately 5 miles long and deviates from the Applicant Preferred Route southeast of Melrose (Figure 1-10).

Option 10

Option 10 is approximately 1.5 miles long and deviates from Route A 0.5 miles north of Saint Rosa (Figure 1-8).

Option 11

Option 11 is approximately 3 miles long and deviates from Route E 1 mile west of Rockville (Figure 1-12).

Option 12

Option 12 consists of a small segment of Route E which is approximately 1.2 miles long and two segments of Route B which measure approximately 1.8 miles just southeast of St Joseph. (Figure 1-10).

Amended Scope Areas

The Applicant requested an amendment the scope of the project to include the additional route options described below. Two of the route options occur in the Fargo area and were developed to avoid future Red River flood mitigation construction. An additional option was developed to enter into the Quarry Substation from the west, which could avoid conflicts with the proposed St Cloud to Monticello 345 kV transmission line connection. There was a route adjustment made to an area of Route E in the Albany area which was developed to avoid future expansion plans at a concrete plant. Additionally, an expansion of the Alexandria Switching Station is needed to accommodate the installation of new equipment for the 345 kV transmission line.

AS-1

AS-1 is approximately 16 miles long and runs in an east-west direction near the Red River. This option is located approximately 3 miles south of the Applicant Preferred Route. (Figure 1-5)

AS-2

AS-2 is approximately 21 miles long and runs in a north-south direction between the Applicant Preferred Route and AS-1. (Figure 1-5)

AS-3

AS-3 is the Alexandria Switching Station expansion and in includes approximately 4.3 acres.

AS-4

AS-4 is a wide spot in Route E and would add an additional 3,000 feet (Figure 1-12).

AS-5

AS-5 is approximately 2 miles long and parallels State Highway 138 and would terminate at the Quarry Substation (Figure 1-9).

Route D/E is a combination of a 1 mile long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.

1.5 ROUTE WIDTH

The Applicants have proposed a route approximately 1,000 feet in width for the majority of the Project. Roads, property boundaries, fence lines, and other alignment opportunities typically are found in 0.25-mile intervals and rural settlement also tends to have a similar 0.25-mile pattern.

In order to take advantage of the presence of existing linear infrastructure and associated right-of-way, the Applicants propose to parallel the I-94 corridor for portions of the Applicant Preferred Route and Routes C, D, E, F, G and H.

To address the potential for conflicts with I-94 right of way, the Applicants specifically identified three alignment options for the Applicant Preferred Route and Route A in the permit application that use varying amounts of right-of-way.

- **Maximum ROW Occupancy** - the alignment centerline is generally 5 feet from the edge of I-94 right of way
- **Minimum ROW Occupancy** – the alignment centerline is generally 25 feet from the edge of I-94 right of way
- **No ROW Occupancy** - the alignment centerline is generally 75 feet from the edge of I-94 right of way

The EIS evaluates the Minimum ROW Occupancy (hereinafter referred to as the ROW Occupancy alignment option) and No ROW Occupancy alignment options for the routes that parallel the I-94 corridor. The Maximum ROW occupancy will not be evaluated in the EIS. Placing the transmission 5 feet from the I-94 right-of-way has the potential to interfere with the flow of traffic and the safe operation of vehicles. This conflicts with Mn/DOT procedures for utility accommodation, which could prohibit the ability to obtain an approved permit from Mn/DOT to construct the transmission line.

The Applicants also requested a route that is wider than a 1,000 feet but less than 1.25 miles in width in 41 specific locations along the proposed routes to accommodate site-specific considerations or substation interconnection requirements that warrant additional flexibility for line placement. Figure 1-16 provides an overview of the locations where Applicants request a route wider than 1,000 feet. Thirteen of these 35 locations have been widened beyond 1,000 feet due to existing interchanges. Table 1.5-1 identifies the expanded route width locations.

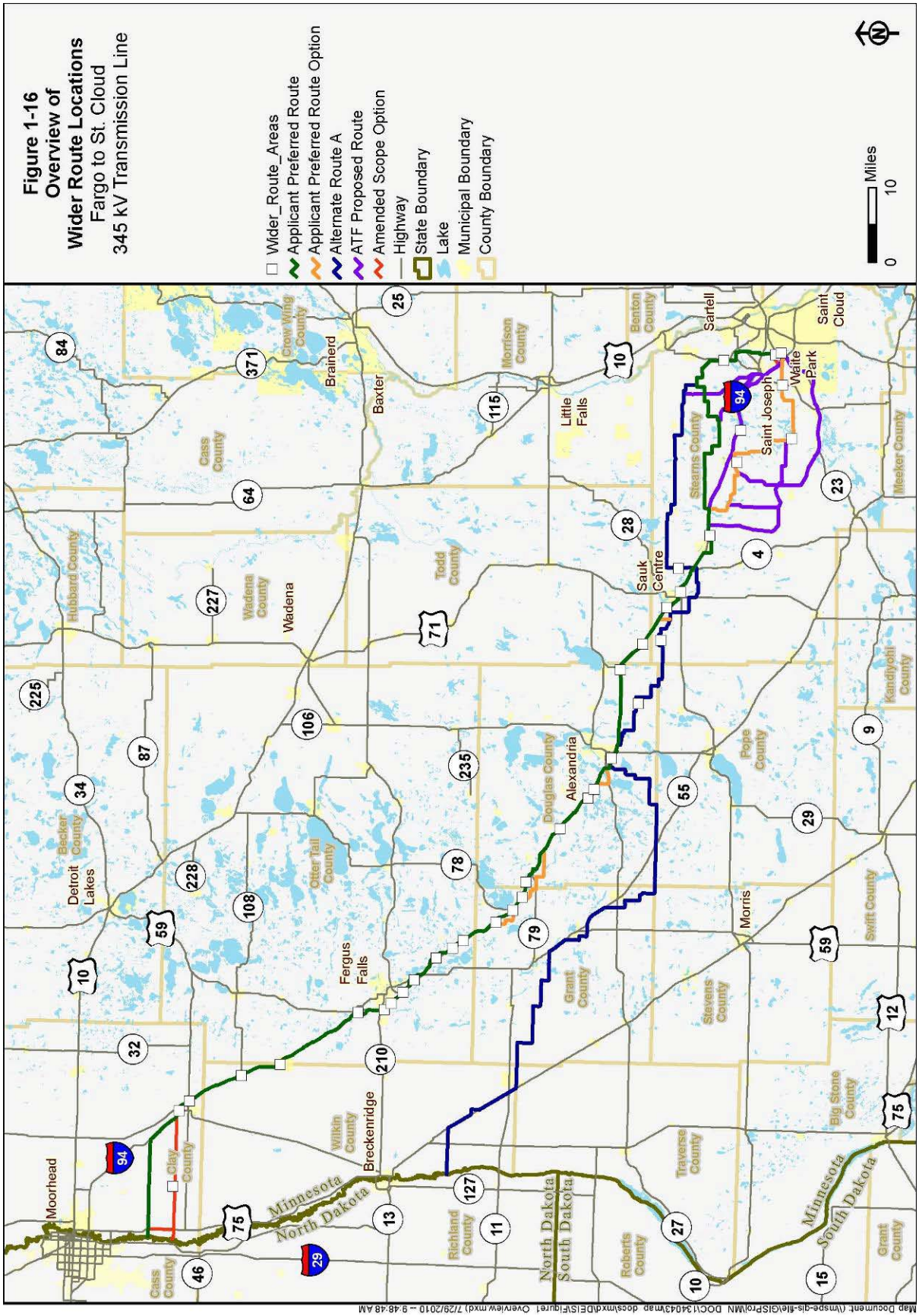


Figure 1-16
Overview of
Wider Route Locations
Fargo to St. Cloud
345 kV Transmission Line
Wider_Route_Areas
Applicant Preferred Route
Applicant Preferred Route Option
Alternate Route A
ATF Proposed Route
Amended Scope Option
Highway
State Boundary
Lake
Municipal Boundary
County Boundary
Miles
0
10
Moorhead
Clay County
Cass County
Hubbard County
Becker County
Detroit Lakes
Wadena County
Wadena
Cass County
Crow Wing County
Brainerd
Baxter
Otter Tail County
Fergus Falls
Todd County
Morrison County
Douglas County
Alexandria
Little Falls
Benton County
Sartell
Saint Cloud
Stearns County
Sauk Centre
Saint Joseph
Waite Park
Meeker County
Kandiyohi County
Pope County
Morris
Stevens County
Swift County
Grant County
Wilkin County
Breckenridge
Richland County
Traverse County
Big Stone County
Roberts County
Minnesota
North Dakota
South Dakota

Table 1.5-1. Areas with Increased Route Width

Widened Area Location	Rationale for Increased Route Width
North Dakota-Alexandria – Preferred Route	
I-94 (milepost 098 to milepost 097) and State Highway 114	Interstate interchange
I-94 (milepost 096 to milepost 095)	Site-specific consideration of proximity to existing residence or land held in fee by the USFWS
I-94 (milepost 090) and Douglas County Road 7	Interstate interchange
I-94 (milepost 082 to milepost 079)	Site-specific consideration of proximity to existing residences and lands held in fee or easement by the USFWS
I-94 (milepost 077) and State Highway 78	Interstate interchange
I-94 (milepost 075 to milepost 073)	Site-specific consideration of lands held in fee or easement by the USFWS and a Mn/DOT scenic easement
I-94 (milepost 069 to milepost 068)	Site-specific consideration of Mn/DOT scenic easements
I-94 (milepost 068 to milepost 066)	Interstate interchange and site-specific consideration of lands held in fee or easement by the USFWS and a Mn/DOT scenic easement
I-94 (milepost 66) and Tumuli Road to I-94 (milepost 63) and Otter Tail County Road 82	Site-specific consideration of proximity to existing residences or land held in fee by the USFWS
I-94 (milepost 062 to milepost 059)	Interstate interchange and site-specific consideration of proximity to existing residence land held in easement by the USFWS, Minnesota Department of Natural Resources (DNR) Wildlife Management Area (WMA), and a Mn/DOT scenic easement
I-94 (milepost 058) and State Highway 210/Otter Tail County Road 25	Interstate interchange
I-94 (milepost 056) and Otter Tail County Road 1	Interstate interchange
I-94 (milepost 55) and Otter Tail County Road 15 west to I-94 (milepost 54) and State Highway 210	Interstate interchange and site-specific consideration of Mn/DOT scenic easements
I-94 (milepost 52 to milepost 50) and U.S. Highway 59	Interstate interchange and site-specific consideration of lands held in fee and easement by the USFWS and a Mn/DOT scenic easement
I-94 (milepost 38) and Wilkin County Road 11	Interstate interchange
I-94 (milepost 33 to milepost 32) and State Highway 108	Interstate interchange
I-94 (milepost 25 to milepost 24) and State Highway 34	Interstate interchange and site-specific consideration of proximity to existing guyed communication towers
I-94 (milepost 23 to milepost 22) and State Highway 9	Interstate interchange
Alexandria Substation	Amended scope request to add land to the Alexandria Substation
Minnesota-North Dakota border at a point approximately 3 miles south of the Applicant Preferred Route running 16 miles east to the Applicant Preferred Route	Amended scope request to add this option to avoid future Red River flood mitigation construction.
Additional acreage at the Alexandria Switching Station.	Amended scope request to an additional 4.3 acres at the Alexandria Switching Station.

Widened Area Location	Rationale for Increased Route Width
Alexandria-Sauk Centre – Preferred Route	
I-94 (milepost 131) and State Highway 4/Stearns County Road 65	Interstate interchange
I-94 (milepost 129 to milepost 127)	Sauk Center Airport
I-94 (milepost 125 to milepost 126) and Stearns County Road 72	Interstate interchange
I-94 (milepost 119) and Todd County Road 92	Interstate interchange
I-94 (milepost 115 west to milepost 114) and State Highway 127	Interstate interchange
I-94 (milepost 104) west to State Highway 27	Interstate interchange and substation interconnection requirements
Alexandria-Sauk Centre – Route A	
0.5 mile west of intersection of 430th Street and Stearns County Road 183 to intersection of 440th Street and Stearns County Road 189. Ashley Township, Section 2, 3, and 4 in T126N, R35W and Sections 33, 34, and 35 in T127N, R35W.	Site-specific consideration of potential for impact to existing or future uses of affected land(s) and DNR WMA
0.5 mile east of intersection of Mikes Road Southeast and Douglas County Road 31 to ¼ mile west of the intersection of Balm of Gilead Road Southeast and Walsh Drive Southeast. Orange Township, Sections 17, 18, 19, 20, 29, and 30, Hudson Township, Sections 13 and 34.	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
Sauk Centre-St Cloud	
Preferred Route	
New Quarry Substation	Substation interconnection requirements
I-94 (milepost 138) and State Highway 237	Interstate interchange
I-94 (milepost 137 to milepost 136)	Site-specific consideration of shallow depths to groundwater within the area
Route A	
North of intersection of Stearns County Road 185 and 355th Avenue (Melrose Township, Sections 17 through 20)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
Route D	
I-94 and County Hwy 75 (St Joseph Township Section 5)	I-94 median widens requiring wider width to allow for construction on both sides of the highway.
I-94 in Avon Township Section 29	To avoid crossing Mn/DOT rest area.
Between Sand Lake Road west to Stearns County Highway 23	Amended scope request to widen Route E in the Albany is to accommodate future expansion plans at a concrete plant.
Route E	
North of intersection of Stearns County Roads 2 and 139 (St. Joseph Township Section 29 and 30)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
Island Lake Road and Stearns County Road 160 (St. Joseph Township Section 25, Collegeville Township Section 26)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)

Widened Area Location	Rationale for Increased Route Width
Manana Road and Stearns County Road 9 (Collegeville Township Section 31, Farming Township Sections 36, Munson Township Section 1, and Wakefield Township Section 6)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
Sand Lake Road and Mapleview Road (Farming Township Sections 2 and 3, Albany Township Sections 34 and 35)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
I-94 (milepost 140) and Rimcrest Road (Oak Township Sections 3, 4, 9, and 10)	Site-specific consideration of potential for impact to existing or future uses of affected land(s)
Route F	
I-94 and TH 23 St Joseph Township section 26, 35	Interstate interchange

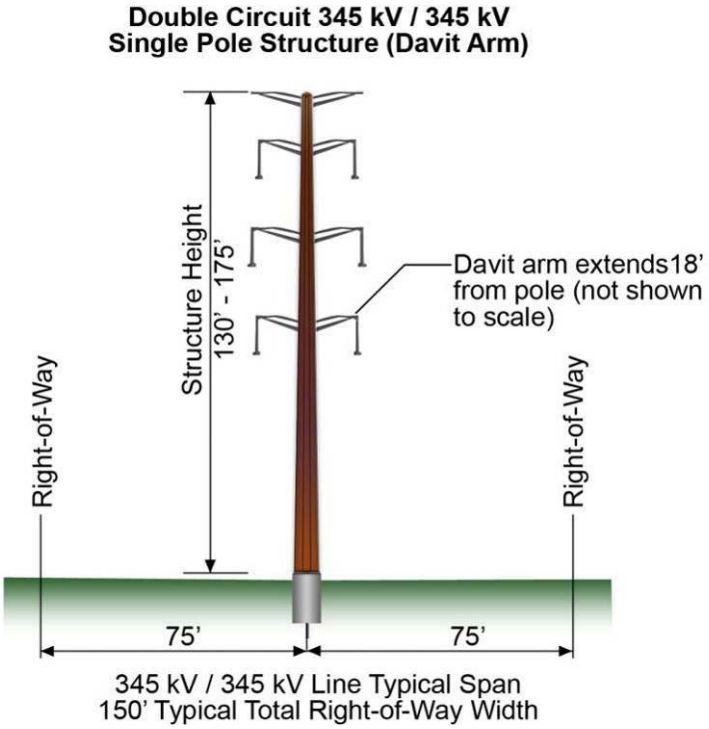
There are also areas where the Proposed Routes have been narrowed from 1,000 feet. The route width is narrower in these areas due to the occurrence of lands held in fee by the USFWS, across which an overhead transmission line would not be a permitted use. The minimum route width requested is 400 feet in these locations. Table 1.5-2 identifies the narrowed route width locations.

Table 1.5-2. Areas with Decreased Route Width

Narrow Area Location	Rationale for Decreased Route Width
North Dakota-Alexandria	
Applicant Preferred Route	
South of I-94 in T135-R45-S9 in Wilkin County	Haugrud-Sillerud WPA
North of I-94 in T135-R45-S10 in Wilkin County	Bellmore WPA
North of I-94 in T134-R44-S35 in Otter Tail County	Sethre WPA
T133-R43-S20 in Otter Tail County	Kunz WPA
T143-R43-S19 in Otter Tail County	Wildung WPA
T142-R43-S14, 23 in Otter Tail County	Knollwood WPA
T131-R42-S5-6, 8-9 in Otter Tail County	Nicholson WPA
T131-R42-S15-16 in Otter Tail County	Ten Mile WPA
T130-R41-S17 in Grant County	Pelican Creek WPA
T129-R41-S1 in Grant County	Bah Lakes WPA
T129-R40-S9, 16 in Douglas County	Zickur WPA
T128-R39-S13 in Douglas County	Lobster Lake WPA
Route A	
T127-R41-S15 in Grant County	Mittelstadt WPA
T127-R41-S10 in Grant County	Hoffman WPA
T126-R40-S5 in Pope County	Hagstrom WPA
Alexandria-Sauk Centre – Applicant Preferred Route	
T126-R34-S5-6 in Stearns County	Zehrer WPA
T126-R34-S23-24 in Stearns County	McCormick Lake WPA
T125-R34-S24 in Stearns County	Schuman WPA
T127-R36-S20 in Douglas County	Orange WPA
Sauk Centre-St Cloud – Route E-F	
S125-R32-S23 in Stearns County	Oak WPA

According to the Applicant the proposed 345 kV transmission line would be built primarily with single pole structures, which typically require a ROW 150 feet in width for the length of the transmission line. In some limited instances, where specialty structures are required for long spans or in environmentally sensitive areas, up to 180 feet of ROW may be needed. When the transmission line is placed cross-country across private land, an easement for the entire 150 foot ROW would be acquired from the affected landowner(s). Applicants propose to locate the poles as close to property division lines as reasonably possible. An illustration of a structure with associated ROW limits is shown in Diagram 1-1.

Diagram 1-1. Double Circuit 345 kV Structure with ROW



Source: HDR, 2009

When the transmission line parallels other existing infrastructure ROW (e.g., roads, railroads, other utilities), an easement of lesser width may be possible as parts of the ROW of the existing infrastructure can often be combined with the ROW needed for the transmission line. When paralleling existing ROW, Applicants' typical practice is to place the poles on adjacent private property several feet off the existing ROW, unless the adjacent ROW is used by another transmission line where a larger buffer is preferred. With this pole placement, the transmission line partially occupies the existing ROW, thereby reducing the size of the easement required from the private landowner. For example, if required ROW is 150 feet and the pole is placed 5 feet off of an existing road ROW, only an 80-foot-wide easement would be required from the landowner as the transmission line would also occupy road ROW. The arms on the pole would be approximately 85 feet above the ground depending on span length, and extend approximately 18 feet from the center of the pole. In the scenario presented above, this would result in the davit arms extending into the airspace above the existing infrastructure ROW. To address potential concerns with this encroachment into the airspace above existing transportation ROW, the Applicants have proposed to place poles an average of 25 feet from the edge of the existing I-94 ROW. This would leave approximately seven feet between the end of the davit arms and the existing ROW. This gap could provide some buffer for "blowout" of the lines – a situation where the actual conductors sway out of their normal position due to high winds.

In each instance of occupying existing ROW, Applicants would have to acquire necessary approvals from the ROW owner (e.g. railroad, Mn/DOT) or the agency overseeing use of a particular ROW (e.g. Federal Highway Administration).

These ROW occupancy scenarios (limited occupancy and no occupancy) are illustrated below in Diagrams 1-2 and 1-3.

Diagram 1-2. Double Circuit 345 kV/345 kV Single Pole Structure (Davit Arm) with No Occupancy of ROW

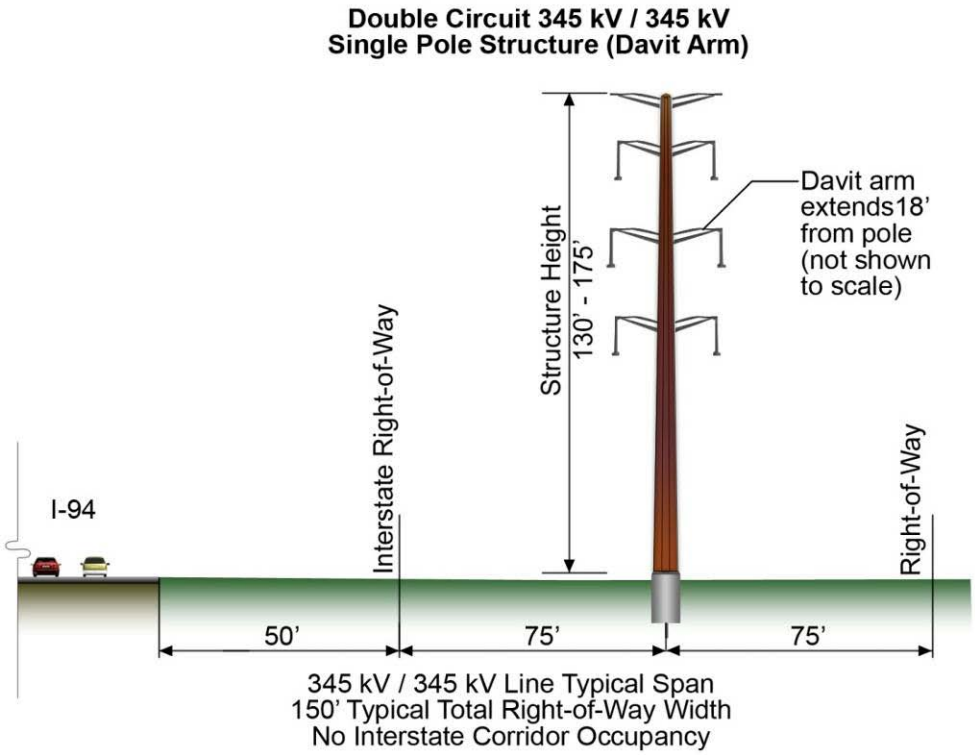
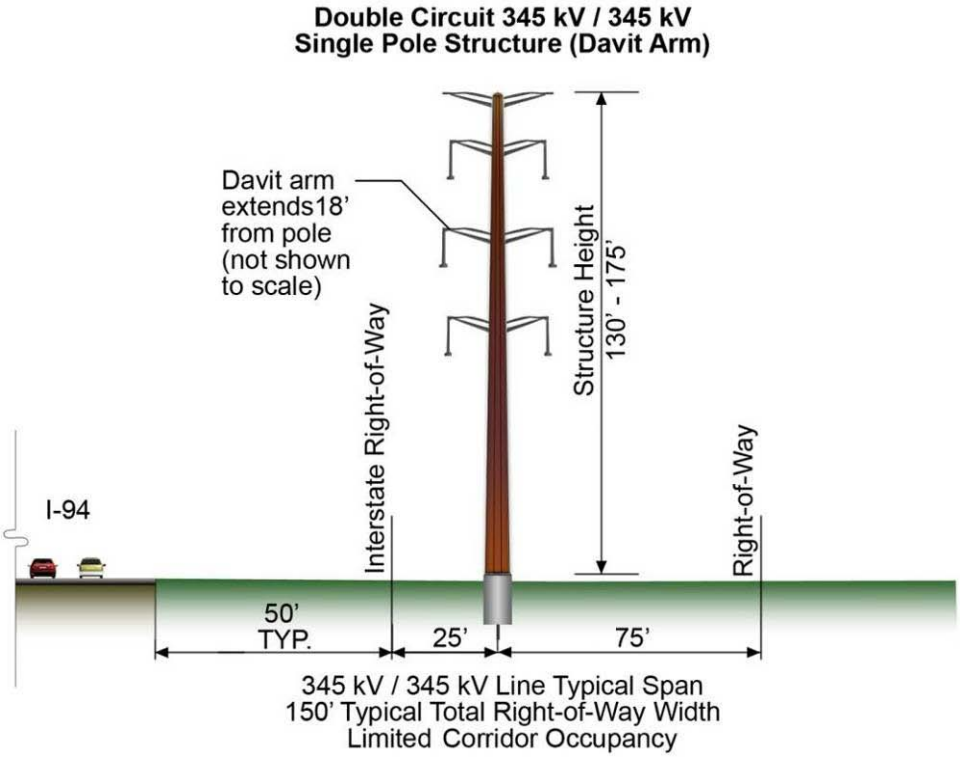


Diagram 1-3. Double Circuit 345 kV/345 kV Single Pole Structure (Davit Arm) with Limited Occupancy of ROW



As discussed previously, the Applicants have sought to identify areas to use the ROW associated with existing infrastructure, including interstates, highways, and railroads. This approach is intended to meet the statutory requirements of Minn. Stat. 216E.02, which calls for large electric power facilities to be located in a manner compatible with environmental preservation and efficient resource use. One option to limit environmental impacts is to place new power lines near existing infrastructure as a way to minimize the proliferation of new routes. However, this may result in other transportation operation and maintenance impacts.

1.5.1 Land Acquisition Transmission Line ROW

The ROW acquisition process begins early in the detail design process. For transmission lines, utilities typically acquire easement rights to accommodate the facilities. The evaluation and acquisition process includes title examination, initial owner contacts, survey work, document preparation, and purchase. Each of these activities, particularly as it applies to easements for transmission line facilities, is described in more detail below.

The first step in the ROW process is to identify all persons and entities that may have a legal interest in the real estate upon which the facilities would be built. To compile this list, a ROW agent or other persons engaged by Applicants would complete a public records search of all land involved in the Project. A title report is then developed for each parcel to determine the legal

description of the property and the owner(s) of record of the property and to gather information regarding easements, liens, restrictions, encumbrances and other conditions of record.

The next step is evaluation of the specific parcel. After owners are identified, and typically after a Route Permit is issued, a ROW representative contacts each property owner or the property owner's representative. The ROW agent describes the need for the transmission facilities, how the specific Project may affect each parcel, and seeks information from the landowner about any specific construction concerns. The ROW agent may also request the owner's permission for survey crews to enter the property to conduct preliminary survey work. Permission may also be requested to take soil borings to assess soil conditions and determine appropriate foundation design. Surveys are conducted to locate ROW routes, natural features, and man-made features and associated elevations used during the detailed engineering of the transmission line. The soil analysis is performed by an experienced geotechnical testing laboratory.

During the evaluation process, the proposed transmission line's location would be staked. This means that the survey crew identifies the proposed location of each structure or pole on the ground and marks it with a surveyor's stake. The ROW agent shows the landowner exactly where the structure(s) would be located on the property as well as delineates the boundaries of easement area required for safe operation of the line.

The ROW agent then negotiates with the property owner(s) to determine the amount of just compensation for the rights to build, operate, and maintain the transmission facilities within the easement area and reasonable access to the easement area. The agent also provides maps of the transmission line route or site and the landowner's parcel and offers compensation for the transmission line easement. In the event that a complicated appraisal problem arises, an appraisal is completed by the utility's representative(s) to determine the value of the land rights being acquired. The landowner is allowed a reasonable amount of time to consider the offer and present any material that the owner believes is relevant to determining the property's value.

If the landowner desires a second opinion on the fair market value of the property, the landowner may have an appraisal made. The landowner fee awarded may not exceed $1,500 toward the appraiser fee as long as the appraisal follows standard and accepted appraisal practices. Minn. Stat. 117.189.

In nearly all cases, utilities are able to work with the landowners to address their concerns and an agreement is reached for the utilities' purchase of land rights. The ROW agent prepares all of the documents required to complete each transaction. Required documents may include: easement, purchase agreement or contract and deed. In rare instances, if a negotiated settlement cannot be reached, the landowner may choose to have an independent third party determine the value of the land acquisition. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to Minn. Stat. 117.

The process of exercising the right of eminent domain is called condemnation. In the event of a condemnation, the utility would provide the landowner with a copy of each appraisal it has obtained for the property interests to be acquired. To start the condemnation process, a utility files a petition in the district court where the property is located and serves that petition on all owners of the property. If the court approves the petition, the court then appoints a three-

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

Once ROW is acquired and prior to construction, the ROW agent would again contact the owner of each parcel to discuss the construction schedule and requirements. To ensure safe construction of the transmission line, special consideration may be needed for fences, crops, or livestock. For instance, fences may need to be moved or temporary or permanent gates may need to be installed, crops may need to be harvested early, and livestock may need to be moved. In each case, the ROW agent coordinates these processes with the landowner, who is compensated for damages.

1.5.2 Substation Land Acquisition

As the regulatory review process proceeds, Applicants' representatives would consult with the owners of parcels suitable for the substations to discuss the Project in detail prior to conducting any necessary surveys and soil investigation. Applicants would also develop more site-specific designs. Contacts with the owners of affected properties would continue and the negotiation and acquisition phase would begin for Applicants to obtain the necessary land or easement rights for the proposed substation alternatives. Wherever possible, Applicants would seek to obtain necessary property rights through voluntary purchase.

During the acquisition phase, individual property owners would be advised as to the construction schedules, needed access to the site and any vegetation clearing required for the Project. The site would be cleared of the amount of vegetation necessary to construct, operate, and maintain the proposed Substations. Also, any vegetation that is in the way of construction equipment may have to be removed.

Soil analysis at the substation sites would be required to assist with the final design of the substation. Applicants would inform landowners at the initial survey consultation that these borings would occur. An independent geotechnical testing company would take and analyze these borings.

1.6 ESTIMATED PROJECT COST

Estimated cost are summarized in Table 1.6-1 below and provided in 2009 dollars. Final costs will depend on the final route permitted and the final alignment developed.

Table 1.6-1. Cost Estimates

Route/Option	Cost
Applicant Preferred	$254,000,000
Route A	$294,000,000
Route B	$334,000,000
Route C	$283,000,000
Route D	$250,000,000
Route D	$285,350,000 **
Route E	$253,000,000
Route F	$265,100,000
Route G	$255,800,000
Route H	$255,400,000
Cost Estimates for Route Options *	
Route Option 1	$7,000,000
Route Option 2a	$15,725,000
Route Option 2b	$14,620,000
Route Option 3	$7,000,000
Route Option 4	$8,500,000
Route Option5	$5,100,000
Route Option 6	$2,500,000
Route Option 7	$3,400,000
Route Option 8	$850,000
Route Option 9	$6,700,000
Route Option 10	$2,500,000
Route Option 11	$5,100,000
Amended scope Areas and Alexandria Substation*	
AS-1	$2,890,000
AS-2	$5,100,000
AS-3(Alexandria Substation)	N/A
AS-4	$850,000
AS-5	$3,400,000

**The cost estimates for the route options and amended scope areas were calculated by taking the length of the Route Option times $1,700,000 million dollars per mile.*

*** This cost estimate included only the 13 miles of undergrounded transmission line not the entire route D.*

There may be additional but minimal costs associated with the final connections and configurations at the substation to allow for the interconnection of the Fargo to St. Cloud 345 kV Project.

1.6.1 Operation and Maintenance

The primary operating and maintenance cost for transmission lines is the cost of inspections, usually done monthly by air and by ground once a year. Annual operating and maintenance costs

for transmission lines in Minnesota and the surrounding states vary depending upon the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used and the transmission line's age. For 115 kV through 345 kV transmission lines, past experience has shown that for the first 10 years of operation, operation and maintenance costs are minimal; after the first 10 years, costs range from $300 to $500 per mile.

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

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2.0 REGULATORY FRAMEWORK

A high voltage transmission line (HVTL) of this size requires two approvals from the Commission: a Certificate of Need and a Route Permit. This Section describes the process a permit applicant is required to follow under the full permitting process for a HVTL in the State of Minnesota. Additional federal, state, and local permits and approvals required for construction of the project are identified in Section 8.

2.1 CERTIFICATE OF NEED

A Certificate of Need is required for any "large energy facility" being proposed in the State of Minnesota. A large energy facility includes "any high-voltage transmission line with a capacity of 200 kilovolts (kV) or more and greater than 1,500 feet in length" (Minn. Stat. 216B.2421, subd. 2(2)). The Applicants filed an application with the Commission on August 16, 2007 for a Certificate of Need to construct the following 345 kV transmission line projects in Minnesota.

- The Twin Cities to La Crosse (now referred to as Hampton to La Crosse project PUC Docket No. E002, ET2/TL-09-1448),
- The Twin Cities to Fargo (now referred to as the Fargo to St. Cloud 345 kV Project), ,
- The Monticello to St Cloud project, which was issued a Route Permit by the Commission on July 12, 2010 (PUC Docket No. E002, ET2/TL-09-246) and,
- The Brookings to Twin Cities (now referred to as Brookings County to Hampton (PUC Docket No. E002, ET2/TL-08-1474).
- The certificate of need for the CapX2020 345 kV Transmission Lines projects can be found in PUC Docket No. ET-2, E-002, et al./CN-06-1115.

The Commission referred the matter to the Office of Administrative Hearings for hearing before an Administrative Law Judge (ALJ). Prior to the evidentiary hearing, 19 public hearings were held in the areas where the three 345 kV projects are proposed, commencing on June 17, 2008, in Moorhead, Minnesota and ending July 2, 2008, in Rochester, Minnesota. An evidentiary hearing was held from July 14, 2008, to August 1, 2008; from August 11, 2008, to August 14, 2008; and from September 11, 2008, to September 18, 2008, in St. Paul, Minnesota.

On February 27, 2009, the ALJ submitted a report to the Commission containing the Findings of Fact, Conclusions of Law, and Recommendation. In that report, the ALJ determined that certificates of need for the Fargo to Monticello 345 kV Project should be granted using double-circuit capable structures with only the first circuit being implemented at this time. The Commission issued an Order Granting a Certificate of Need With Conditions on May 22, 2009. An additional Order was issued on August 10, 2009, updating conditions.

2.2 ROUTE PERMIT

A route permit must be granted to any permit applicant proposing to construct a large electric power generating plant or a HVTL in Minnesota. Minn. Stat. 216E.03 Subd. 3 states, "Any person seeking to construct a large electric power generating plant or a high voltage transmission

line must apply to the board for a site permit or a route permit." Minn. Stat. 216E.01, Subd. 4 defines a HVTL as "a conductor of electric energy and associated facilities designed for and capable of operation at a nominal voltage of 100 kilovolts or more and is greater than 1,500 feet in length."

Under the siting authority defined by Minn. Stat. 216E.02, it is the policy of the Commission to choose routes "that minimize adverse human and environmental impact while insuring continuing electric power system reliability and integrity, and insuring that electric energy needs are met and fulfilled in an orderly and timely fashion." The route permit would contain conditions specifying construction and system operational standards.

2.3 ENVIRONMENTAL REVIEW PROCESS

Route permit applications for high voltage transmission lines are subject to environmental review in accordance with Minn. Rules 7850.1700 to 7850.2700 (full permitting process). Scoping is the first step in the permitting process after application acceptance. The scoping process has two primary purposes, to ensure that the public has a chance to participate in determining what routes and issues to study in the EIS, and to help focus the EIS on the most important issues surrounding the route permit decision.

EIS scoping is the first step in the environmental review process after the application has been accepted. The scoping process has two primary purposes:

- to ensure that the public has a chance to participate in determining what routes and issues to study in the EIS, and
- to help focus the EIS on the most important issues surrounding the route permit decision.

OES staff collected and reviewed comments on the scope of the EIS by holding twelve public scoping meetings. Two meetings (one in the afternoon, and one in the evening) were held at each of the following venues:

- Broadway Ballroom, Alexandria, Minnesota – January 19, 2010
- American Legion, Melrose, Minnesota – January 20, 2010
- El Paso Sports Bar and Grill, St. Joseph, Minnesota – January 21,2010
- Bigwood Event Center, Fergus Falls, Minnesota – January 26, 2010
- Hildebrand Hall, Barnesville, Minnesota – January 27, 2010
- Dream Weaver's Banquet Facility, Elbow Lake, Minnesota – January 28, 2010

Approximately 1,000 people attended the twelve scoping meetings, which provided the public an opportunity to learn about the proposed Project and the route permitting process, review the route permit application, and ask questions and submit comments. A court reporter was present at each of the public meetings and transcribed questions asked and comments made by the public as well as responses from the OES and the Applicants. The OES also accepted written comments from December 18, 2009 through February 12, 2010.

In addition, OES convened a 14 member Alternative Task Force (ATF). The ATF was charged with: (1) identifying local site or route specific impacts and issues of local concern, and (2) identifying alternative transmission line routes or substation locations that may maximize positive impacts and minimize or avoid negative impacts of the Project. The task force met three times between January and February 2010. The ATF issued a Final Report in March 2010. The report identified six route alternatives to be considered in the EIS. The ATF reports are available at http://energyfacilities.puc.state.mn.us/Docket.html?Id=25053.

All of the written and oral comments submitted at the scoping meetings along with comments received by mail and email were reviewed and entered into a database. Each comment was evaluated for issues or concerns that should be considered for detailed evaluation in the EIS and were classified based on the major topics of the comments. The Scoping Decision Document was developed using the relevant comments received during the public process.

The Scoping Decision Document for this DEIS was issued by the Director of the Office of Energy Security on April 15, 2010, and an amendment was released on July 15, 2010. The documents are attached as Appendix A. The public will be given additional opportunities to participate in the environmental analysis process for the Proposed Project. A comment period, as required under Minn. Rule 7849.5300, subp. 7, will be open from September 6, 2010 (the publication date of this DEIS), until October 18, 2010. A copy of this DEIS has been placed in the public libraries noted in the Abstract. A notice of the availability of this DEIS has been sent to each person on the Project contact list, and has also been placed in the *EQB Monitor*.

Public information meetings on the DEIS will be held during the public comment period. The public will be given an opportunity to comment on the DEIS at the public meeting and throughout the comment period. After the DEIS comment period, the OES staff will prepare a FEIS. The FEIS will include all necessary revisions to the analysis of impacts, as well as responses to substantive comments on the draft

Once the DEIS is published, a comment period along with public information meetings will be held. After the close of the comment period, the OES staff will prepare a Final EIS (FEIS) based on public comments. The FEIS will include revisions to the draft as well as staff responses to comments on the DEIS.

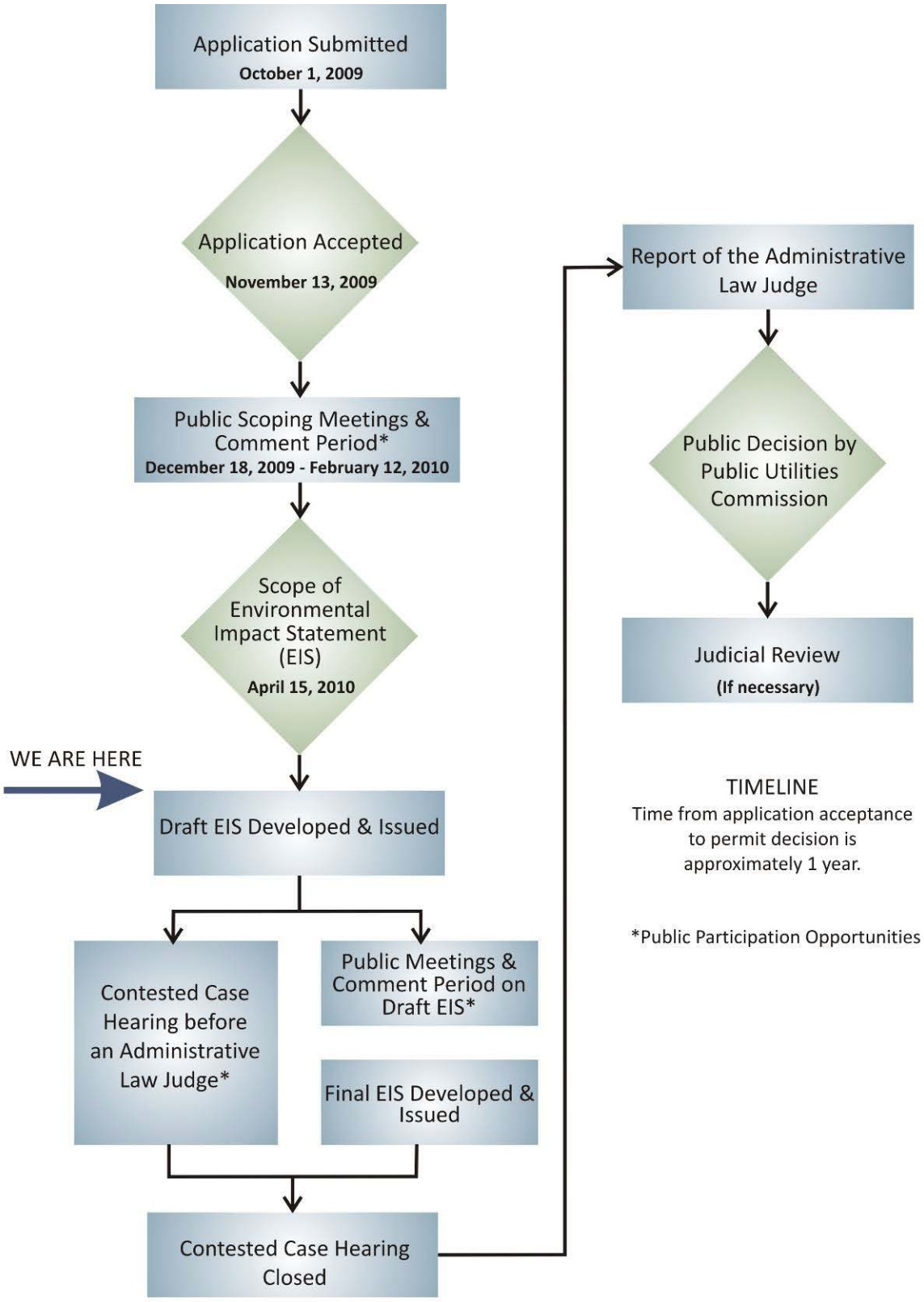
A public hearing will also be held as a separate proceeding. The hearing will be conducted by an Administrative Law Judge (ALJ), who will ensure that the record created at the hearing is preserved and transmitted to the Commission. The ALJ will prepare a report that will include proposed findings of fact and conclusions, and a recommendation. Public hearings will be held along the route November 15-19, and November 29-December 3, 2010. An evidentiary hearing will be held in St. Paul on December 6, 2010, continuing through December 17, 2010, as necessary. Details regarding the specific times and locations of hearings will be provided in local papers, in the EQB Monitor, and on the OES website.

After the FEIS is published and the ALJ issues the findings of fact, conclusion of law, and order with recommendations, the Commission will make a route permit decision. The date for the Commission's decision will not be scheduled until the FEIS and ALJ report are issued.

The Commission must first find that the DEIS has adequately addressed potential environmental issues presented in the scoping decision. Then the Commission will make a decision on which route to permit and what conditions to include in the route permit.

The diagram below illustrates the permitting process and also identifies where this Project is in the process.

Diagram 2-1. Permitting Process



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3.0 ENGINEERING AND OPERATION DESIGN

An HVTL consists of three phases, each at the end of a separate insulator string, all physically supported by structures. Each phase consists of one or more conductors. When more than one conductor is used to make up a phase, the term "bundled" conductors is used. Conductors are metal cables consisting of multiple strands of steel and aluminum wire wound together. There are also two shield wires strung above the electrical phases to prevent damage from lightning strikes. These cables are typically less than 1 inch in diameter. The shield wire can also include fiber optic cable which provides a communication path between substations for transmission line protection equipment. There are several different types of structures used for transmission lines, including single steel pole structures and H-frame structures. Transmission lines are constructed in a ROW, which is primarily dependent on structure design, span length, and the electrical safety requirements associated with the transmission line's voltage.

3.1 TRANSMISSION LINE CONDUCTORS

Each phase would normally consist of bundled conductors composed of two 954 Aluminum Conductor Steel Supported (ACSS) cables or conductors of comparable capacity. Each conductor is 954,000 circular mils or approximately 1.2 inches in diameter. ACSS consists of steel wires at the center surrounded by aluminum strands. Applicants propose to use the same conductor and bundled configuration for most of the Project. Table 3.2-1 summarizes the structure designs and foundations for the proposed single pole structures that would be installed for the Project.

3.2 TRANSMISSION LINE STRUCTURES

Applicants propose to use primarily single pole, self-weathering or galvanized steel double circuit capable structures (Table 3.2-1). Only one circuit would be installed for this Project. Self-weathering steel oxidizes or rusts to form a dark reddish brown surface coating to protect the structure from further weathering. Single steel pole structures are typically placed on a concrete foundation. There may be site-specific conditions where specialty structures, such as structures having a reduced height, or multiple pole structures will be required. One such condition that may require the use of reduced height structures includes the Sauk Centre Airport and the area immediately surrounding the airport. A second condition includes an area encompassing Melrose within which the existing groundwater level is at a shallow depth and may require the use of a modified foundation type. Large angles may require multiple pole structures.

Figure 3-2 summarizes the structure designs and foundations for the proposed single pole structures that may be installed for the Project.

Table 3.2-1. Structure Design Summary

Line Type	Structure Type	Structure Material	ROW Width (feet)	Structure Height (feet)	Structure Base Diameter (inches)	Foundation Diameter (feet)	Span Between Structures (feet)
345 kV/345kV Double Circuit	Single Pole Davit Arm	Steel	150 total	130-175	36-48 (tangent structures) 48-72 (angle structures)	6-12	600-1,000

According to the Applicant the proposed transmission line and substation would be designed to meet or surpass all relevant local and state codes, NESC and North American Electric Reliability Corporation (NERC) requirements, and Applicants' standards. Appropriate standards would be adhered to for construction and installation and all applicable safety procedures would be followed during and after installation.

As stated in the Application, the Applicants are currently exploring the cost, technical, and potential regulatory considerations surrounding whether it would be more appropriate to install the davit arms and conductor for the second circuit of this project at the time of initial construction. The lines would be operated as a single circuit until future circumstances and regulatory approvals deem the second circuit necessary. The Applicants' transmission planners are also analyzing the installation of all davit arms as part of initial construction without stringing the conductor associated with the second circuit which may be a lower cost approach because it would mitigate the need for larger structures and would avoid expensive and complex construction on the poles after the first circuit has been energized. The Applicants will continue to analyze the impacts, costs, and regulatory considerations associated with concurrent installation and will provide additional information in the routing proceeding.

The following conditions were included in the July 12, 2010, Commission Order for a Route Permit for the Monticello to St. Cloud 345 kV transmission line which is similar to the Fargo to St. Cloud project.

- The Permittees (Applicants) are allowed to install six conductors at highway crossings and interchange locations in order to minimize transportation disruption in the event additional lines are authorized along the route.
- The proposed line will be built using double-circuit capable poles; only one circuit will be installed for this Project. The second position will be available for a possible future additional circuit.

The existing Alexandria Switching Station will be expanded to accommodate the proposed 345 kV transmission line. The equipment to be installed may include switches, a transformer, control panels, circuit breakers, foundations, and structures. The Applicants have requested an additional 4.3 acres of land, beyond the area requested in the Application, to install this equipment.

4.0 CONSTRUCTION

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

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

4.1 TRANSMISSION LINE AND STRUCTURES

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

Construction equipment that would be used on the Project consists of tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks, and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles would be transported on tractor-trailers.

Staging areas would be established for the Project. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials would be stored at the staging areas until they are needed for the Project. Temporary lay down areas may be required for additional space for storage during construction. These areas would be selected for their location, access, security, and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. The temporary lay down areas and any staging areas outside of the transmission line ROW would be obtained from affected landowners through rental agreements.

Access to the transmission line ROW route would be made directly from existing roads or trails that run parallel or perpendicular to the transmission line ROW. In some situations, private field roads or trails may be used. Permission from the property owner would be obtained prior to accessing the transmission line route. Where necessary to accommodate the heavy equipment used in construction; including cranes, cement trucks and hole-drilling equipment; existing access roads would be upgraded or new roads would be constructed. New access roads would

also be constructed when no current access is available or the existing access is inadequate to cross roadway ditches.

When it is time to install the poles, they are would be moved from the staging areas, and delivered to the staked location. The structures would be placed within the ROW until set. Insulators and other hardware would be attached while the pole is on the ground. The pole is then lifted, placed and secured using a crane. The conductors are then clipped to the insulators.

In general, structures would have drilled pier concrete foundations Drilled pier foundations may vary from 6 to 12 feet in diameter and 25 or more feet deep, depending on soil conditions. After the concrete foundation is set, the pole is bolted to the foundation. Concrete trucks are required to bring the concrete in from a local concrete batch plant.

Construction mats would also be placed in wet or soft soil locations and narrow ditches to minimize disturbances. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site. If landowner permission is obtained, it is preferred to spread excess soil from foundation holes on the structure site. If that is not permitted, it would be offered to the landowner or would be completely removed from the site.

The conductors are then installed by establishing stringing setup areas within the ROW or on temporary construction easements outside the ROW. These stringing setup areas would be located every two miles along a Project route. Conductor stringing operations also require brief access to each structure to secure the conductor wire to the insulator hardware and the shield wire to clamps once final sag is established. When the transmission line crosses streets, roads, highways, or other energized conductors or obstructions, a temporary guard or clearance poles would be installed. This ensures that conductors would not obstruct traffic or contact existing energized conductors or other cables during stringing operations; it also protects the conductors from damage.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas would be to span all streams and rivers. In addition, Applicants would avoid driving construction equipment waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices help prevent soil erosion and ensure that equipment fueling and lubricating would occur at a reasonable distance from waterways. Additional mitigative measures relating to wetlands are contained in Section 5.19, et al.

4.2 SUBSTATIONS

According to the Application construction is planned to begin once required approvals are obtained and property acquisition is complete. A detailed construction schedule would be developed based upon the availability of crews, weather conditions, spring load restrictions on roads and any specific area restrictions in place to minimize construction impacts.

Once the site is graded, a perimeter fence would be erected to secure the site. Concrete foundations would be poured to support the substation equipment and the control house. After

grading, fencing and foundation work have been completed, the substation and control house erection would commence. Applicants would also construct permanent access roads to provide for ingress and egress for its substation operating personnel and equipment maintenance.

Erosion control methods would be implemented to minimize runoff during construction. Applicants would comply with all local, state, NESC, and internal standards regarding clearance to ground, clearance to other utilities in the area, clearance to buildings, and other applicable standards.

4.3 CLEANUP AND RESTORATION

During construction of the transmission line and in areas outside of the fenced area of the existing and proposed substations, crews would attempt to limit ground disturbance wherever possible. However, areas are disturbed during the normal course of work, which can take several weeks in any one location. As construction on each parcel is completed, disturbed areas would be restored to their original condition to the maximum extent practicable. The ROW agent would contact each property owner after construction is completed to see if any damage has occurred as a result of the Project. If damage has occurred to crops, fences or the property, Applicants would fairly reimburse the landowner for the damages sustained.

In some cases, Applicants may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Portions of vegetation that are disturbed or removed during construction of transmission line would naturally reestablish to pre-disturbance conditions. Resilient species of common grasses and shrubs typically reestablish with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line route would require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences; and
- Straw bales.

These erosion control and vegetation establishment practices are regularly used in construction projects and are referenced in the construction permit plans developed to comply with the stormwater NPDES permit. Long-term impacts are minimized by utilizing these construction techniques.

4.4 MAINTENANCE

The following discussion focuses on maintenance requirements for transmission lines and substations through the life of the facility operations.

4.4.1 Transmission Lines

Transmission lines are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation. The estimated service life of a transmission line for accounting purposes is approximately 40 years. However, from a practical perspective, HVTLs are seldom completely retired. Transmission infrastructure has very few mechanical

elements and is built to withstand weather extremes that are normally encountered. With the exception of severe weather conditions such as tornadoes and ice, transmission lines rarely fail. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure is in excess of 99 percent.

The principal operating and maintenance cost for transmission facilities is the cost of inspections, usually done monthly by air. Annual operating and maintenance cost for transmission lines in Minnesota and the surrounding states vary. For voltages from 115 kV through 345 kV, the Applicants' experience shows that 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.

4.4.2 Substations

Similar to transmission lines, substations are also designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation. The principal operating and maintenance cost for substation facilities is the cost of routine inspections. Substations require a certain amount of maintenance to keep them functioning in accordance with accepted operating parameters and NESC and NERC requirements. Transformers, circuit breakers, batteries, protective relays and other equipment need to be serviced periodically in accordance with the manufacturer's recommendation. The site itself must be kept free of vegetation and drainage must be maintained. The substation equipment that would be installed as part of the Project includes state of the art circuit breakers designed to minimize the risk of sulfur hexafluoride (SF6) release. SF6, used as an insulator in breakers, is considered a greenhouse gas by the Environmental Protection Agency (EPA). Current technologies require less SF6 at lower pressures than older technologies, resulting in a more secure system. Absent an equipment failure, newer breakers contain and maintain SF6 levels and do not sustain the releases associated with older circuit breakers.

4.5 UNDERGROUND OPTION

As discussed in Section 2.3 of this document, OES convened an Advisory Task Force (ATF). The ATF was charged with: (1) identifying local site or route specific impacts and issues of local concern, and (2) identifying alternative transmission line routes or substation locations that may minimize or avoid negative impacts of the project. The ATF recommended six additional route alternatives to the Applicants' proposed routes.

One of the routes identified by the ATF, Route D, has a number of underground components. The underground sections that were proposed by the ATF were developed to mitigate in areas where it would be difficult to place an overhead transmission line. The following provides a general description of construction methods, ground disturbance, and ROW widths. Chapter 7 of this document includes a more detailed discussion of each of the resources that may be impacted by underground construction.

4.5.1 Underground Construction Methods

Underground lines require additional equipment to compensate for voltage rise along the distance of the transmission line. The additional equipment translates to a higher overall cost, limits the length of the underground installation, and increases the likelihood of failure due to additional components. Depending on the type of cable system used, cooling equipment may be required at underground transmission line substations. Overhead lines are air cooled and widely spaced for safety.

In general, there are three major types of underground transmission facilities: high- and low-pressure oil-filled systems, solid dielectric systems, and compressed gas insulated systems. These systems may require the installation of additional cables to meet the equivalent capacity requirements of the overhead line. For the purposes of this EIS, a high-pressure oil-filled system (HPFF) has been assumed, given the relatively high voltage of the proposed line.

Where undergrounding of high voltage transmission lines is necessary, there are a number of factors that should be considered. Installation generally includes direct burial in backfilled trenches and concrete trenches with covers or concrete duct banks. Constructing the trench for the underground transmission line would result in greater temporary construction impacts than the proposed overhead line. Underground transmission construction as compared to overhead lines increases noise, dust, and traffic disruption. Considerable clearing and grading would be expected in suburban and rural settings, and dust and noise from construction would last three to six times the duration of an overhead line. Concrete manholes or large splice vaults are needed at recurring intervals. Similarly, maintenance and repair activities for underground lines may result in greater disturbance than overhead lines.

A typical progression rate for underground construction would be two to three days for each 200-foot section of trench. Approximately 500-to 700-feet of trench is open at one time. Steel plates are typically placed over open sections of trench when crews are not at that location. Access to homes (driveways, front yards, sidewalks, and street parking) may be limited during construction and traffic detours may be required. According to the Applicants, underground conductors of the size appropriate for this Project are generally limited to approximately 1,000-foot-long segments, due to the state of the technology, materials, and shipping weight and size restrictions.

An underground line would be routed to avoid other underground installations such as water, gas, and sewer lines. Unstable slopes, hazardous material sites, wetlands, and bedrock would be avoided. Going under a road, highway, or river requires construction techniques such as directional boring. All these aspects of underground transmission construction lead to a higher cost than overhead line construction.

No routine maintenance or operation costs are anticipated for underground transmission lines (Xcel Energy, 2009). Visual inspections of underground transmission lines are not possibleand will not be conducted. Unlike overhead transmission lines that are susceptible to a number of sources and outages (e.g., weather, birds, vehicle impacts), underground transmission lines are susceptible to only two outage causes: cable fault due to overloading of the system and failure of

the cable or splices. If a fault is sensed on the transmission system, the underground transmission line will need to be accessed.

The time and cost to repair an underground transmission line would be greater than those anticipated for an overhead transmission line. While overhead transmission lines fail, on average, once every 17.8 years, underground transmission lines fail once every 50.5 years (Xcel Energy, IR Request, 2009). In addition, the average time to resolve a failure on an overhead transmission line is nine hours. The average time to resolve a failure on an underground transmission line is three weeks (Xcel Energy, IR Request, 2009).

4.5.2 Underground Right-of-way

Underground right of way widths can be limited to the area containing the transmission line and an area on each side of the transmission line, set aside to protect the line from unintentional excavation damage and to provide access. Underground right-of-way widths would vary between 55-60 feet of permanent easement depending on the type of underground cable system installed.

This would allow the two circuits to be installed a minimum of 10 foot inside each right of way line, and still maintain a separation of 20 feet from the edge of each circuit trench. For separate rights of way, a minimum 30 foot permanent easement would be needed for each circuit, supplemented with an additional 20 foot temporary construction easement, when crossing private land.

4.5.3 Ground Disturbance

Underground construction involves extensive ground disturbance which includes trenching along the entire line length of the installation. Sensitive features such as streams, rivers, lakes, and wetlands may exist in the underground installation area. Underground transmission would require constructing through these sensitive features. Directional boring can be used to avoid impacts to rivers, streams, and wetlands. Where directional boring is not feasible, trenching through sensitive areas would be necessary for underground construction.

Underground construction requires extensive coordination with other underground utilities to avoid damage during construction. The potential to disrupt or damage underground utilities is usually greater with underground construction. Replacement or repair activities may have additional ground disturbance for underground lines. Overhead repair work usually involves light impact at the structure locations. Secondary off-site ground disturbing impacts may be required for underground lines if selective fill is required for heat dissipation. Materials source sites must be excavated to obtain this select fill material.

Underground construction requires the right-of-way, including temporary and permanent easements, to be totally cleared to allow for construction and establishment of the transmission corridor. This includes trees, brush, and ground cover. While low growing vegetation can be reestablished over an underground installation, trees or plants with woody roots cannot be allowed to grow over the line.

4.5.4 Access Vaults

Access vaults are needed periodically along an underground route to facilitate cable installation, for maintenance requirements and access for future repairs. Vaults would be typically spaced every 2,000 to 2,500 feet along the route. The size of each vault would be about 6 feet wide by 28 feet long.

4.5.5 Transition Structures

Transition structures will be required at every point the transmission line transfers from above ground to below ground. The foundation of these structures is typically 250 feet by 250 feet.

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5.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION - NORTH DAKOTA TO ALEXANDRIA

Section 5 analyzes the human and environmental impacts associated with each route alternative between North Dakota and Alexandria. Two route alternatives (Applicant Preferred and Route A) were analyzed within this area, which includes Clay, Wilkin, Traverse, Otter Tail, Grant, Douglas, Stevens, and Pope counties in Minnesota. In addition to the two routes, six route options associated with the Applicant Preferred Route and a 4.3 acre expansion at the Alexandria Switching Station were also analyzed. The Applicant Preferred Route begins at the Red River (the Minnesota-North Dakota state line), just south of Fargo. Route A begins at the Red River, approximately 45 miles south of Fargo. The analysis for the North Dakota to Alexandria section ends at the Alexandria Switching Station in Douglas County. A summary of the impacts is included in Appendix I.

In general, a 1,000-foot route width is used to describe the affected environment for each resource (see Section 1.5 for a discussion of areas wider or narrower than the general 1,000 foot width). An assumed 150-foot ROW within the route is used to determine potential impacts for each route alternative and each route option alternative. Evaluation of each route option includes a comparison to the corresponding section of the Applicant Preferred Route. In addition, the area of Option AS-3 is not a route alternative; Option AS-3 contains additional property needed to construct the Alexandria Switching Station.

5.1 HUMAN SETTLEMENT

Human settlement includes the developed portion of the environment, social and economic characteristics, land use, and associated development issues that affect land use, pipelines, and noise.

5.1.1 Affected Environment

The study area for affected environment is generally the 1,000-foot transmission line route for each proposed route alternative. The affected environment for Human Settlement describes the existing conditions associated with human influenced development in the area such as the current socioeconomic conditions and the general land development patterns. This section discusses these conditions within the affected counties and municipalities that would be crossed by the proposed transmission line.

Socioeconomic Resources

The proposed routes are located in Clay, Wilkin, Traverse, Otter Tail, Grant, Douglas, Stevens, and Pope counties in Minnesota. These counties will likely experience effects on local employment and economies from the construction and operation of the proposed project. The seven-county area where the routes cross is primarily rural. The affected area in Douglas County contains the largest population due to its proximity to the city of Alexandria. According to the U.S. Census, the total population within the townships which would be affected by the proposed routes was estimated in 2008 to be 15,320.

The population of the townships where the routes are located best represents the population of the affected environment since these are the smallest geographic areas for which population estimates are available. As shown in Table 5.1-1, the population of the affected townships compared to the total county population for most counties was less than 10 percent. However, in Grant and Douglas counties, the affected townships represent 34 percent and 23 percent, respectively, of the total county population. This is due to the small population of Grant County and the proximity of the routes in Douglas County to the city of Alexandria, which has an estimated 2008 population of 12,415.

Table 5.1-1. Population of Townships in Study Area

County	Total County 2008 Population Estimate	2008 Population within Study Area Townships and Cities	
		Total	Percent of County Population
Clay	55,732	1,303	2
Wilkin	6,374	550	9
Traverse	3,602	37	1
Otter Tail	56,895	2,655	5
Grant	5,947	2,036	34
Douglas	36,224	8,153	23
Stevens	9,612	188	2
Pope	10,950	398	4
Total	**185,336**	**15,320**	**8**

[1] *Locations include the townships within each county that are touched by any of the route alternatives.*
Source: U.S. Census, 2008 Population Estimates

Table 5.1-2 shows the 2000 population broken down by racial category for the townships within the study area. The population of the townships affected in each county was approximately 99% white in 2000.

Table 5.1-2. 2000 Racial Characteristics of Townships in the Study Area

County	Population*	White or Caucasian	Black or African American	American Indian	Asian	Other Races
Clay	1,319	1,305 (98.8%)	2 (0.1)	2 (0.1%)	1 (0.08%)	0
Wilkin	557	553 (99.3%)	3 (0.5%)	1 (0.2%)	0	0
Traverse	53	53 (100%)	0	0	0	0
Otter Tail	3,986	3,953 (99.2%)	6 (0.2%)	14 (0.4%)	13 (0.3%)	0
Grant	2,079	2,067 (99.4%)	9 (0.4%)	1 (0.05%)	1 (0.05%)	0
Douglas	7,523	7,474 (99.3%)	4 (0.05%)	12 (0.2%)	27 (0.4%)	6 (0.08%)
Stevens	210	208 (99.0%)	0	0	0	2 (0.1%)
Pope	605	601 (99.3%)	1 (0.2%)	2 (0.3%)	1 (0.2%)	0

**Represents population of townships within each county that are affected by a route alternative.*
Source: U.S. Bureau of the Census, Census 2000

Income characteristics for the study area are presented at a county level in Table 5.1-3. Per capita personal income for the counties in the study area remains below the state average; however, the rate of increase for each county since 1998 was substantially higher.

Table 5.1-3. Per Capita Personal Income in the Study Area

Location	1998	2003	2008	% Change 1998-2008	Percentage of Individuals Below Poverty Level 2000
Clay County	$21,227	$27,827	$33,988	21.3	13.2
Wilkin County	$21,177	$30,604	$41,932	50.0	8.1
Traverse County	$22,802	$27,567	$40,986	36.2	12.0
Otter Tail County	$21,767	$27,027	$33,513	16.6	10.1
Grant County	$22,448	$28,165	$38,437	29.7	8.4
Douglas County	$22,822	$22,822	$36,655	21.7	8.5
Stevens County	$22,660	$29,354	$40,186	34.4	13.6
Pope County	$21,956	$29,548	$37,542	29.5	8.8
State of Minnesota	**$29,273**	**$35,281**	**$42,953**	**11.2**	**7.9**

Source: Minnesota Office of the State Demographer, Income estimates, 2008: County level income data for Minnesota. U.S Bureau of the Census, Census 2000, General Demographic Characteristics.

Historically, the economies of the affected counties have been based in agricultural production. The economic base for counties and communities within the study area are manufacturing,

service establishments, and agricultural industries. The higher poverty rates in Clay and Otter Tail counties can be explained by the lower incidence of non-agricultural work. According to the U.S. Census Bureau Quick Facts, 2.7 percent of Clay county businesses include private, non-farm establishments. Otter Tail County includes 3.1 percent. The smaller percentage of available employment in these counties can explain the higher poverty rates. The largest industry in terms of employment within the project area is manufacturing, followed by wholesale trade, retail, and food service.

Land Use and Zoning

The land use study area includes all land within the routes and adjacent properties. Land uses and zoning in this area include agricultural, residential, and commercial. Agricultural uses predominate; commercial uses are located in and adjacent to the incorporated areas of Fergus Falls and Alexandria where development densities are higher. Interspersed commercial and industrial uses occur along Interstate 94 and other roadways. Existing land uses and zoning near these incorporated areas include residential, commercial, and industrial. Existing land use in the area is predominantly agricultural or undeveloped land; however, low density, single-family, or rural residential uses also occur. Table 5.1-4 shows the area of agricultural, residential, and commercial/industrial zoning within the Applicant Preferred Route, Route A, and the route option alternatives.

Table 5.1-4. Zoning Within Each Route and Route Option

Route/ Option	Acres and Percentage of Zoned Land Use						
	Agriculture/ Undeveloped	Residential	Commercial/ Industrial	Municipal	Recreation	Special Agricultural	Transitional
Route Alternatives							
Applicant Preferred	7,305 (76%)	811 (8%)	416 (4%)	0 (0)	1,122 (12%)	0 (0)	0 (0)
Route A	7,789 (74%)	680 (6%)	0 (0)	61 (1%)	561 (5%)	555 (5%)	868 (8%)
Route Options							
Option 1	451 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Option 2a	1,018 (95%)	0 (0)	0 (0)	0 (0)	58 (5%)	0 (0)	0 (0)
Option 2b	1,048 (78%)	0 (0)	0 (0)	0 (0)	290 (22%)	0 (0)	0 (0)
Option 3	0 (0)	204 (46%)	0 (0)	0 (0)	236 (54%)	0 (0)	0 (0)
Amended Scope Options							
Option AS-1	9,404 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Option AS-2	3,605 (99.8%)	0 (0)	7 (0.2%)	0 (0)	0 (0)	0 (0)	0 (0)
Option AS-3	0 (0)	4 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Local zoning districts traversed by the proposed routes include mostly agricultural-related classifications although residential, commercial, and industrial zoning districts are also affected. Approximately three-quarters of each corridor is zoned for agricultural use. Residential and recreation zoning districts also encompass approximately 20 percent of the Applicant Preferred Route corridor and 11 percent of the Route A corridor. The route option alternatives are also predominantly agricultural zoning with the exception of Option 2b which contains 22 percent recreation land and Option 3 which contains approximately half residential and half recreational zoning.

The entire study area is zoned by the county or city zoning jurisdictions. Clay, Wilkin, Otter Tail, Grant, Douglas, Stevens, and Pope counties administer zoning over their respective unincorporated areas. The cities of Fergus Falls and Alexandria administer zoning regulations within their city limits and plan for future growth and development beyond their present boundaries.

Displacement

Table 5.1-5 shows the number of residential and nonresidential structures within the 1,000-foot routes for each alternative and option area. There are 96 residential structures within the Applicant Preferred Route compared to 77 within Route A. The greater number of nonresidential structures in both route and route option alternatives is reflective of accessory buildings such as barns or agricultural uses and commercial buildings near highway ROW.

Table 5.1-5. Residences and Nonresidential Structures Located Within the Routes and Route Option Areas

Route/Options	Structures Within 1,000-Foot Routes and Substation Areas	
	Residences	Nonresidential Structures
Routes Alternatives		
Applicant Preferred	96	371
Route A	77	237
Route Options		
Option 1	2	4
Option 2a	2	20
Option 2b	8	14
Option 3	71	11
Amended Scope Options		
Option AS-1	34	155
Option AS-2	27	109
Option AS-3	0	0

Pipelines

Four underground pipelines exist in the North Dakota to Alexandria portion of the project. The Amoco liquid pipeline and Williams Brothers pipeline run from northwest to southeast. Another Amoco pipeline commences approximately a mile south of Rothsay and also runs in a northwest to southeast direction. A fourth pipeline, the Great Plains Natural pipeline, runs in an east west direction. The Amoco Liquid and Williams Brothers pipelines transport oil. The Great Plains pipeline transports natural gas. (See Appendix H)

Noise

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise levels is

perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Cumulative noise increases occur on a logarithmic scale. If a noise source is doubled, there is a three dBA increase in noise, which is barely discernible to the human ear. For cumulative increases resulting from sources of different magnitudes, the rule of thumb is that if there is a difference of greater than 10 dBA between noise sources, there will be no additive effect (*i.e.*, only the louder source will be heard and the quieter source will not contribute to noise levels). Therefore, predicted noise levels associated with the transmission line are typically much lower than the ambient noise in the project area and will not increase the existing background noise levels in the project area. Table 5.1-6 provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 5.1-6. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet engine (at 25 meters)
130	Jet aircraft (at 100 meters)
120	Concert
110	Pneumatic chipper (powered by compressed air or hydraulics)
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Business office
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA (revised, 1999)

The Minnesota Pollution Control Agency (MPCA) has established standards for the regulation of noise levels. The land use activities associated with residential, commercial, and industrial land have been grouped together into Noise Area Classifications (NAC). (Minn. R. 7030.0050). Each NAC is then assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC. (Minn. R. 7030.0040). Table 5.1-7 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent (30 minutes) of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent (six minutes) of the time within an hour. Residences, which are typically considered sensitive to noise, are classified as NAC 1.

Table 5.1-7. MPCA Noise Limits by Noise Area Classification (dBA)

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

5.1.2 Potential Impacts

Potential impacts from the proposed project were quantified, where possible, within the assumed 150-foot ROW for each route and option. . This section includes a discussion of impacts associated with socioeconomic resources, land use and zoning, displacement, property values, pipelines, and noise. Quantities of potentially impacted resources, typically measured by the number of features or acreage affected within a ROW, were compared among the route alternatives and options to determine the range of effects to the resources.

Socioeconomic Resources

The construction and operation of the transmission lines is expected to have minimal influence on the local (county and municipal) economies. In terms of payroll earnings and construction expenditures, the economic benefit from the project could be small relative to the regional economy of Fargo, North Dakota, and to a lesser extent, Alexandria. These two cities are centers of economic activity for the North Dakota to Alexandria section of the corridor study area. The construction, operation, and maintenance of the substations and transmission line are not anticipated to negatively impact socioeconomic resources in the study area.

Immediate short-term positive economic gains could likely result from activities associated with construction of the proposed project, although the construction and operation of the transmission line is expected to have limited influence on the local economy. The counties within the project area may see a small boost in economic benefit due to payroll earnings, employment opportunities, and construction expenditures. Long-term beneficial impacts from the project could include incremental increases in revenues from utility property taxes, which are based on the value of the facilities. Taxes would be paid based on compliance with all applicable Minnesota and county statutes and regulations. Additionally, landowners could receive compensation for the rights to build, operate, and maintain the transmission facilities within the easement area.

Local businesses such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance service providers may also benefit from the project's construction. Local businesses could likely see an increase in revenues from construction, and the number of workers hired from within and outside the project area may result in positive economic gains in the form of increased wages and spending, lodging, meals, and other consumer goods and services. Construction crews would likely require temporary housing, which may include apartment rentals, hotels, motels, or campgrounds. These types of housing are abundant in the Fargo and St. Cloud areas.

Land Use and Zoning

The construction and operation of a transmission line can impact existing and planned land uses and local zoning through the conversion of existing land use to transmission line ROW. Within the route alternatives, the majority of land is used for agriculture or is zoned for agricultural use; therefore this land use type would be most likely to be affected by the project. However, these impacts are anticipated to be limited to pole locations, and the majority of the transmission line ROW could continue to be used for agricultural purposes.

Zoning within each route is illustrative of the type of land use that could be impacted by the ultimate 150-foot transmission line alignment. Quantitative data on specific alignments is provided in Table 5.1-8 and Table 5.1-9 for the Applicant Preferred Route, Route A, and the route options within the North Dakota to Alexandria area. The alignments associated with the Applicant Preferred Route considers ROW occupancy with Interstate 94. The ROW Occupancy alignment proposes an alignment within 25 feet of the Interstate 94 ROW and the no ROW occupancy alignment proposes no ROW occupancy with Interstate 94.

Table 5.1-8. Route Right-of-Way Impact Evaluation for Land Use: Route Alternatives

Route	Acres						
	Agriculture	Residential	Commercial /Industrial	Municipal	Recreation	Special Ag.	Transitional
Applicant Preferred ROW Occupancy	1,034	88	33	0	117	0	0
Applicant Preferred No ROW Occupancy	682	58	22	0	77	0	0
Route A	1,129	105	2	0	87	81	111

The proposed routes shown in Table 5.1-8 primarily cross through agricultural and rural residential land; however, the Applicant Preferred Route also includes area on the fringe of Barnesville, Fergus Falls, and Alexandria. The primary difference between the two routes is how they affect recreation and special agriculture land. The Applicant Preferred Route ROW Applicant Preferred ROW Occupancy alternative would affect 30 additional acres of recreation land compared to Route A. Route A, on the other hand, affects special agricultural and transitional zoned land.

Land use impacts associated with the route options are shown in Table 5.1-9. All three options would result in greater land use disturbance since they all bypass the Interstate 94 corridor to avoid developed uses near Interstate 94. For Option 1, 14 additional acres of agricultural land would be affected compared to the ROW occupancy alternatives. In the Option 2 area, the ROW occupancy alternatives would impact 34 more acres of recreational land than Option 2a. Option 3 would impact more recreation land than the ROW occupancy alternatives.

Table 5.1-9. Route Right-of-Way Evaluation for Land Use: Route Options

Option	Acres						
	Agriculture/ Undeveloped	Residential	Commercial /Industrial	Municipal	Recreation	Special Ag.	Transitional
Option 1							
Applicant Preferred ROW Occupancy	56	0	0	0	0	0	0
Applicant Preferred No ROW Occupancy	37	0	0	0	0	0	0
Option 1	70	0	0	0	0	0	0
Option 2							
Applicant Preferred ROW Occupancy	99	0	0	0	44	0	0
Applicant Preferred No ROW Occupancy	65	0	0	0	29	0	0
Option 2a	158	0	0	0	10	0	0
Option 2b	123	0	0	0	33	0	0
Option 3							
Applicant Preferred ROW Occupancy	0	0	0	0	17	26	0
Applicant Preferred No ROW Occupancy	0	0	0	0	11	17	0
Option 3	0	0	0	0	40	32	0
Amended Scope Options							
Applicant Preferred ROW Occupancy	332	0	0	0	0	0	0
Applicant Preferred No ROW Occupancy	219	0	0	0	0	0	0
Option AS-1	307	0	0	0	0	0	0
Option AS-2 ROW Occupancy	398	0	0	0	0	0	0
Option AS-2 No ROW Occupancy	398	0	0	0	0	0	0
Option AS-3	0	4	0	0	0	0	0

Effects from either route on planned land uses as identified in the future land use plans for each affected jurisdiction would vary. The city of Alexandria has identified a planning area southwest of the intersection of Interstate 94 and Highway 29. Additionally, the city of Barnesville, which is about halfway between Fargo and Fergus Falls, plans for commercial and industrial growth north and northeast of the city adjacent to Interstate 94 and Highway 9. Future annexation by these cities is also planned in these areas which would be affected by the Applicant Preferred Route.

Existing land uses in proximity to any of the routes are not expected to change as a result of construction and operation of the proposed transmission line. In agricultural areas, the majority of land underneath the transmission lines could still be used for agricultural purposes. However, an average of 55 square feet of land would be permanently impacted at each pole location.

Displacement

Displacement of residences and commercial or industrial properties can occur when the transmission line ROW cannot avoid such structures. In such a situation, the property and the structures on it are acquired, and the occupant(s) are relocated to a new residence or business location. However, no likely residential displacement locations within the proposed ROWs were identified. Other nonresidential buildings are also located within the transmission line routes which include commercial buildings and residential accessory structures.

Table 5.1-10 shows the number of residential and nonresidential structures within 500-feet of the proposed ROW centerline for each route. To the extent feasible, the proposed 345 kV transmission line will be designed by the Applicant so that all existing residences are located outside of the required ROW. Given the route lengths in this study area, each route has proximity to residences; however, no residences are located within 75 feet of the proposed ROW for both the Applicant Preferred Route and Route A.

Table 5.1-10. Route Right-of-Way Impact Evaluation for Displacements: Route Alternatives

Route Alternatives	Residences within Proximity of Alignment (Feet)				
	0-75	75-150	150-300	300-500	Total within 500
ROW Occupancy	0	11	31	28	70
No ROW Occupancy	0	11	30	32	73
Route A	0	7	33	36	70

Table 5.1-11 shows the number of residential within 500-feet of the proposed ROW centerline for each route option.

Table 5.1-11. Route Right-of-Way Impact Evaluation for Displacements: Route Options

Alternative	Residences within Proximity of Alignment (Feet)				
	0-75	75-150	150-300	300-500	Total within 500
Option 1					
Applicant Preferred ROW Occupancy	0	0	1	0	1
Applicant Preferred No ROW Occupancy	0	0	1	0	1
Option 1	0	0	1	2	3
Option 2					
Applicant Preferred ROW Occupancy	0	1	7	5	13
Applicant Preferred No ROW Occupancy	0	2	4	3	9
Option 2a	0	2	0	1	3
Option 2b	0	0	2	3	5
Option 3					
Applicant Preferred ROW Occupancy	0	0	1	5	6
Applicant Preferred No ROW Occupancy	0	0	1	9	10
Option 3	0	3	33	33	69
Amended Scope Options					
Applicant Preferred ROW Occupancy	0	3	11	3	17
Applicant Preferred No ROW Occupancy	0	3	11	3	17
Option AS-1	0	0	1	3	4
Option AS-2 ROW Occupancy	0	3	11	8	22
Option AS-2 No ROW Occupancy	0	3	11	8	22
Option AS-3	0	0	0	0	0

As with the Route corridors, no residences are located within 75 feet of the ROW for the route options.

Property Values

Concerns regarding potential effects to property values for parcels of land crossed by the alternative routes were voiced by members of the public during project scoping. A number of research studies have been conducted on the effect of HVTL and other energy facilities on residential properties. A literature review was conducted to determine if conclusive impact assessments can be made. These studies included appraiser studies, attitudinal studies, and statistical analyses. None of the studies reviewed during this research provided conclusive findings which could isolate the impacts of transmission lines on property values.

Property values for parcels of land crossed by or adjacent to the proposed transmission line are not anticipated to significantly change. Literature reviews indicate that although value losses up to 20 percent have been reported (EPRI, 2003), study results are highly dependent on methodology and location. Numerous studies have found that property values for parcels near

transmission lines are more dependent on traditional assessment categories, such as location, house size, and amenities, rather than the presence of a transmission line. Impacts are the greatest for agricultural lands where the transmission lines interfere with cultivating paths and spraying practices, high-end vacation properties, and small homesteads. Loss of value for residential parcels results from concern about health and visual impacts. However, impacts typically diminish within 10 years of transmission line construction. Positive impacts to property values can occur when transmission line ROWs are allowed to be cultivated or developed into recreational areas (Cowger, 1996 and Wisconsin Public Service Commission, 2000).

Several of the studies reviewed indicated that property value losses have been experienced, but decreases in property values are typically minor and the amount of decrease is dependent on the unique circumstances of the each property. A literature review and statistical analysis conducted in 2008 reviewed a number of studies conducted between 1984 and 2007 and evaluated the effect on property values from HVTL in Connecticut and Massachusetts (Voorvaart and Chalmers, 2008). The study concluded that there is no evidence of effects on residential real estate values due to either proximity or visibility of HVTL.

Pipelines

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

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

Capacity effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. To prevent contact shock hazards, proper horizontal and vertical separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) must be maintained.

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

The Applicant Preferred Route would cross the Amoco and Williams Brothers pipelines in T138, R47 Sections 27 and 34 and the Great Plains pipeline in T133, R43 Section 29. The

Applicant Preferred Route would periodically parallel the two Amoco pipelines and the Williams Brothers pipeline from approximately the Fergus Falls area to the Alexandria area. (See Appendix H) Route A would not cross any of the four pipelines in the North Dakota to Alexandria portion of the project.

Noise

Construction activities will generate noise that is short-term and intermittent. Construction activities will be limited to daytime hours classified by the MPCA as between 7 am and 10 pm. As such, the project will not have significant noise effects for the surrounding area.

Transmission lines produce noise under certain conditions. The level of noise depends on conductor conditions, voltage level, and weather conditions. Generally, activity-related noise levels during the operation and maintenance of transmission lines are minimal and do not exceed the MPCA Noise Limits outside of the right-of-way.

In foggy, damp, or rainy weather, transmission lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the conductors. During heavy rain the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, transmission lines will produce audible noise approximately equal to household background levels.

The proposed transmission lines were modeled using referenced noise values and with a 3dB reduction per doubling of distance to simulate divergence due to distance from a line source. Where possible, the model was executed as a worst-case scenario benchmark, to ensure that noise was not under-predicted. Table 5.1-12 presents the L_5 and L_{50} predicted for proposed transmission lines for the project. The L_5 is a noise level that will not be exceeded more than five percent of the time. Using the L_5 for demonstrating compliance with the MPCA L_{10} standard is conservative because the noise level exceeded 10 percent of the time will be less than noise level exceeded five percent of the time.

Table 5.1-12. Calculated Audible Noise for the Operation of Proposed Single/Double Circuit Transmission Line Designs (Receptor 3.28 Feet above Ground)

Structure Type	Noise L_5 (Edge of Right-of-Way75 feet, Estimated Ambient + dBA increase)	Noise L_{50} (Edge of Right-of-Way, dBA)
Steel Mono-Pole 345 kV/345 kV Double Circuit	48.5	45.5

With the 75-foot set-back distance determined to be the buffer within which coronal noise may be audible, each of the proposed routes and options were analyzed to determine if any residential receptors were affected.

Residences residing within 1,000 feet of Applicant Preferred Route or Route A would fall within the NAC 1 category under Minn. Rules. As such, the L10 and L50 from the project must not

exceed nighttime levels of 55 and 50 dBA at these residences, respectively. Since it is assumed that the noise levels generated by the project will be the same at night as those generated during the daytime, compliance with the nighttime levels (more restrictive) will also demonstrate compliance with the daytime noise standards due to greater noise sensitivity of humans at night.

Noise associated with the operation of the proposed 345 kV transmission line along the Applicant Preferred Route or Route A is not predicted to exceed the noise limits identified by the MPCA at any of the adjacent the residential receptors.

5.1.3 Mitigation

Land Use

The Applicant would purchase ROW easements for private property crossed by the transmission line in accordance with state and federal land acquisition requirements. In addition, the transmission line alignment could be designed to avoid structures to the extent practical. No additional mitigative measures are necessary relative to land use.

Displacement

Landowners could be compensated for easements and parcel acquisitions for the project. As described, no residential displacements are anticipated, and nonresidential structure displacements are unlikely. If avoidance cannot be achieved, landowners may be relocated and compensated for all easements and parcel acquisitions.

Property Values

Based on the research conducted it is anticipated that there could be limited impacts on the values of residential properties adjacent to the transmission line, however, the displacement section above indicates that there will be few residential properties in proximity to the line.

Pipelines

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

None of these mitigation methods are expected to require additional ROW. Reducing transmission impedance consists of adding stacked or parallel ground rods to the structure grounding system. This is done adjacent to the transmission structure, thus no additional transmission line ROW is required. Grounding a pipeline typically occurs within the existing pipeline through a de-coupler device to prevent DC cathodic protection current from flowing to the ground. Gradient control wires are typically copper conductors buried parallel to and adjacent to the pipeline (within 5 to 10 feet).

Ground mats consist of an eight-foot-square section of conductors buried underneath where pipeline personnel stand when operating a valve. Dead fronts consist of replacing the existing test sections with test sections that are non-conductive and require no additional land. Lastly, additional "coupon stations" are sometimes installed to monitor the pipeline to insure that mitigative measures are effective at preventing AC pipeline corrosion. These facilities are installed adjacent to the pipeline and use coupons that are exposed to the same environment as the pipeline and are monitored to determine if AC corrosion is occurring. This typically would not require additional ROW.

The Applicants could insure that computer modeling of AC interference effects is completed and that any required mitigation is designed and installed prior to energizing the transmission line. Based on past projects, the cost to complete computer modeling, mitigation design, and installation is low compared to the overall cost of the project. The Applicants have been meeting and working with all known pipeline owners to ensure there is adequate separation between the proposed transmission line and pipelines.

Noise

There are no anticipated noise impacts expected, therefore, no mitigation is necessary.

5.2 PUBLIC HEALTH AND SAFETY

This section summarizes the potential impacts of the proposed transmission line and substations on health and safety, specifically electromagnetic fields (EMF), stray voltage, and health effects. EMF , as it relates to transmission lines, is addressed as two separate fields; electric fields and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line. The intensity of the magnetic field is related to the current flow through the conductors.

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Concerns related to health effects from EMF are also discussed in this section, including potential impacts to implantable medical devices (IMDs).

5.2.1 Affected Environment

The affected environment for public health and safety includes certain activities and facilities within the proposed routes and route options. These activities and facilities include design and construction of the project, farming operations, vehicle use, and metal buildings near power lines, public and emergency services, electromagnetic fields, stray voltage, and implantable medical devices.

Electromagnetic fields

The term EMF refers to electric and magnetic fields that arise from the electrical potential (voltage) and the movement of an electrical charge (current) associated with the transmission

and use of electricity. Electric and magnetic fields are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. The frequency of transmission line EMF in the United States is 60 hertz and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 hertz). For the lower frequencies associated with power lines, the electric and magnetic fields are typically evaluated separately. The intensity of the electric field is related to the voltage of the line, while the intensity of the magnetic field is related to the current flow along the conductors.

Concerns about health effects of EMF from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. Initial epidemiological studies done in the late 1970s showed a weak correlation between surrogate indicators of magnetic field exposure (such as wiring codes or distance from roads) and increased rates of childhood leukemia. (Wertheimer et. al, 1979). More recent studies that used direct measurements of magnetic field exposure show either a very weak, or no statistical correlation with adverse health affects (e.g., Savitz, et. al. 1988), and toxicological and laboratory studies have not identified a biological mechanism between ELF-EMF and cancer or other adverse health effects.

While there are numerous internet sites devoted to EMF dangers (whether from power lines, cell phones, or radio frequency signals), the vast majority of experts believe that EMF from power lines does not cause leukemia or any other health problem. In part, these experts argue the physical impossibility of any health effect due to such low-frequency, low-energy magnetic fields.

Natural and human-made electromagnetic fields are, in fact, present everywhere in the environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter (V/m) to well over several kilovolts per meter (kV/m) produced by the build-up of electric charges in thunderstorms. The Earth itself has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). In addition to the presence of the earth's steady state electric field, an average home experiences additional magnetic fields of 0.5 mG to 4 mG which arise from the general wiring and appliances located in a typical home (National Cancer Institute, 2009).

Electric fields

Electric fields are created by voltage or the difference in the electric charge between two points, and are measured in V/m or kV/m. Higher voltage produces stronger electric fields. The intensity of the electric field decreases significantly with increasing distance from the source and electric fields are easily shielded or weakened by objects such as trees, buildings, clothing, and skin.

The available data for exposure to static electric fields suggest that the only negative human health effects are the direct perception of body hair movement and small shocks, similar to the shock received by the induced friction from walking on a carpet and touching a doorknob. On the whole, scientific evidence indicates that chronic exposure to electric fields at or below levels traditionally established for safety does not cause adverse health effects. Safety concerns related to electric fields are sufficiently addressed by adherence to the NESC.

There are currently no federal guidelines on the strength of electrical fields beneath high voltage transmission lines. However, six states have established regulations or guidelines with regard to transmission line electric fields.

Table 5.2-1. Electric Field Exposure Guidelines

State	Electrical Fields	
	On ROW	Edge of ROW
Florida	8 kV/m[a]	2 kV/m
Minnesota	8 kV/m	
Montana	7 kV/m	1 kV/m[d]
New Jersey		3 kV/m
New York	11.8 kV/m 11 kV/m[e] 7 kV/m[c]	1.6 kV/m
Oregon	9 kV/m	

[a] *For lines of 69-230 kV*
[b] *For 500 kV line*
[c] *Maximum for highway crossings*
[d] *May be waived by the landowner*
[e] *Maximum for private road crossings*

The 8 kV/m guideline used by the Minnesota Public Utilities Commission (Commission) is designed to prevent injury from shocks when touching large objects such as a bus or agricultural equipment parked under high-voltage transmission lines of 345 kV or greater. A route permit for a high-voltage transmission line typically states the line shall be designed, constructed, and operated in such a manner that the electric field measured 1 meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m.

Table 5.2-2. Electric Field Exposure Guidelines

Organization	Electric Field Exposure Guidelines (kV/m)	
	General Public	Occupational
ICNIRP (2009)	4.2	8.3
IEEE (2002)	5	20
ACGIH (2009)	_	25

ICNIRP – International Commission on Non-Ionizing Radiation Protection
IEEE – Institute of Electrical Engineers and Electronic Engineers
ACGIH – American Conference of Governmental Industrial Hygienists

Magnetic Fields

Magnetic fields are created by electric current or flow (measured in amperes). Higher currents produce stronger magnetic fields. However, unlike electric fields, magnetic fields are not easily shielded and pass through most structures or objects. Consequently health concerns regarding EMF have focused more closely on magnetic fields than electric fields.

People encounter magnetic fields from every-day things such as radar and microwave towers, television and computer screens, motors, fluorescent lights, microwave ovens, cell phones, electric blankets, house wiring and hundreds of other common electrical devices. As with electric fields, magnetic fields decrease in strength with increased distance from the source. The strength of both the electric and magnetic fields from transmission lines is inversely proportional to the square of the distance from the source conductors. Magnetic fields also vary in intensity depending on the type of structure and the amount of current flowing through the transmission line in a given area.

There are currently no state or federal guidelines for magnetic fields generated by high-voltage transmission lines. However, several agencies have established exposure guidelines for general public and occupational magnetic field exposure.

Table 5.2-3. States with their Own Magnetic Field Regulations

State	Magnetic Field at Edge of ROW
Florida	150 mG[a] (max load) 200 mG[b] (max load) 250 mG[c] (max load)
New York	250 mG[c] (max load)

a For lines of 69-230 kV
b For 500 kV lines
c For 500 kV lines in certain existing ROW

Table 5.2-4 below outlines Magnetic Field Exposure Guidelines established by the International Commission on Non-Ionizing Radiation Protection (INIRP), the Institute of Electrical Engineers and Electronic Engineers (IEEE) and the American Conference of Governmental Industrial Hygienists (ACGIH).

Table 5.2-4. Magnetic Field Exposure Guidelines

Organization	Magnetic Field Exposure Guidelines (mG)	
	General Public	Occupational
ICNIRP (2009)	833	4,200
IEEE (2002)	9040	27,100
ACGIH (2009)	_	10,000

ICNIRP – International Commission on Non-Ionizing Radiation Protection
IEEE – Institute of Electrical Engineers and Electronic Engineers
ACGIH – American Conference of Governmental Industrial Hygienists

Stray Voltage

Stray voltage is a natural phenomenon that occurs between two contact points in any animal confinement area where electricity is grounded. By code, electrical systems, including farm systems and utility distribution systems, must be grounded to the earth to ensure continuous safety and reliability. Stray voltage is a condition that can occur on the electric service entrances to structures from distribution lines—not transmission lines. More precisely, stray voltage exists

between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors. Where the electrical system is grounded, some current inevitably flows through the ground and a low level of voltage called neutral-to-earth voltage (NEV) develops at these locations. When NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently referred to as stray voltage. Stray voltage is not electrocution, ground current, EMFs, or earth current. Transmission lines have been shown to contribute to stray voltage when the electric distribution system directly serving the farm or wiring of the farm was directly under and parallel to the transmission line. These circumstances are considered and generally avoided during installation of transmission lines therefore mitigating the contribution of stray voltage from the project.

Health Effects

The study of cancer in relation to ELF EMF has been a topic of study since the late 1970s. Since that time there have been several epidemiological studies that have explored the possible association of not only cancer risks, but other potential human maladies (brain tumors, leukemia, breast cancer, and mental health issues). Studies have focused on both occupational exposures for individuals working in electrical industries and public exposures for children and adults living and working around common EMF sources (in-home wiring, transmission lines, home, and office appliances/equipment). The results of the various studies conducted over the last three decades, specifically those regarding the relationship between EMF and childhood leukemia and other cancer risks, have been mixed; some have found an association while others have not.

Where there is association suggested in epidemiological studies, it is usually very near the statistical threshold of significance. However, when these studies are repeated in a laboratory, the results have not reproduced or identified a biological mechanism to support a link between childhood leukemia and magnetic fields. The replication of field results in a laboratory setting is a basic test of scientific validity. Researchers continue to look at magnetic fields until more certain conclusion can be reached.

The World Health Organization (WHO), in 1996, launched a large multidisciplinary research effort to address growing public concerns over the possible health effects from exposure to EMF. Based on in-depth review of scientific literature the WHO concluded that, "…current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research." Leukemia is the most common childhood cancer worldwide for children ages zero to 14, with approximately 2,600 cases diagnosed in the United States annually.

The cause of childhood leukemia is not known. Many suspected risk factors that have been studied and evaluated, but ultimately most children with leukemia do not have any risk factors, and as stated above, the cause of their cancer is not known at this time. In the case of high-voltage power lines as a suspected risk factor, the WHO indicates that few children have time-averaged exposures to residential 60 Hz magnetic fields in excess of the levels suspected to be associated with an increased incidence of childhood leukemia. Approximately 1 to 4 percent have mean exposures above 3 mG and only 1 to 2 percent have median exposures in excess of 4 mG. If there are any health risks, such as childhood leukemia, associated with living near power

lines, then it is clear those risks are very small, otherwise we should be witnessing an observable epidemic of childhood cancers. However, there is little, if any evidence of such an epidemic of childhood cancer.

IMDs are those that are intended to be completely or partially introduced into the human body, indefinitely. Common IMDs include: pacemakers, implantable cardioverter defibrillators (ICDs), neurostimulators, cochlear implants and insulin pumps. Interference with the operation of pacemakers and implantable cardioverters/defibrillators is a potential impact of electric fields. Interference with IMDs can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction. Modern bipolar devices are much less susceptible to interactions with electric fields.

5.2.2 Potential Impacts

Electric Fields

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, which is in close proximity to the transmission line. HVTLs can induce a voltage on objects and therefore make it possible for current to flow as the object is discharged. The voltage buildup is dependent on many factors, including the weather; object shape, size, orientation, and capacitance; object to ground resistance; and location along the ROW. 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 might 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. It is important to note that underground transmission lines still generate electric fields that are detectable above the ground surface.

The main concern with induced voltage on an object is the discharge through the person to ground if contact is made with the object. The best method to avoid these discharges is to avoid parking equipment directly under the transmission line. To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (ma). Based on Applicants' 115 kilovolts (kV), 230 kV, and 345 kV transmission line operating experience, the discharge from any large mobile object—such as a bus, truck, or farm machinery— parked under or adjacent to the transmission line are less than 5 ma and would unlikely reach levels considered an annoyance. Applicants would also assure that any fixed object, such as a fence or other large permanent conductive object in close proximity to or parallel to the transmission line, would be grounded so any discharge would be less than the 5 ma NESC limit.

Similarly, the Commission's standard of maximum electric field limit of 8 kV/m measured 1 meter above ground was designed to prevent serious hazard from shocks when touching large objects placed under AC transmission lines of 500 kV or greater. The proposed facilities would comply with the NESC and Commission standards.

Table 5.2-5 provides electric fields at the maximum conductor voltage for the type of transmission line facilities proposed. Electric fields were calculated using ENVIRO, a software program licensed by the EPRI. The calculated electric field assumed the maximum operating

voltage of 362 kV, which is 105 percent of the nominal voltage for the transmission line. For any specific design, the set of phase conductors' height above ground has a marked influence on the maximum electric field. The phasing arrangement is of particular importance for the maximum field for a double circuit configuration (two circuits on a single structure).

Table 5.2-5. Predicted Electrical Fields (kV/m) for Proposed Double Circuit 345 kV Transmission Line Designs (3.28 Feet above Ground)

Structure Type	Nominal Voltage (kV)	Distance to Proposed Centerline											
		-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'
Single Pole Davit Arm 345kV Single Circuit Delta Config	362	0.05	0.12	0.65	1.15	2.02	2.56	2.32	4.34	2.28	0.99	0.52	0.11
Single Pole Davit Arm 345kV Single Circuit Vertical Config	362	0.08	0.16	0.21	0.31	1.50	4.27	3.81	1.22	0.19	0.14	0.19	0.12
Single Pole Davit Arm 345kV/345kV Double Circuit with One Circuit In Service	362	0.04	0.08	0.11	0.05	0.22	1.16	3.76	4.30	1.58	0.40	0.18	0.12
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	362	0.02	0.05	0.15	0.42	1.41	3.46	2.48	3.46	1.41	0.42	0.15	0.05

The predicted electric field strengths range from 2.35 kV/m to 3.76 kV/m at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 5.2-3 and the Commission's maximum safety limit of 8 kV/m.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge would drain off when the charger unit is connected to the fence. When the charger is disconnected, either for maintenance or when the fence is being built, shocks may result.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines would be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields, and grazing lands specified by the NESC.

Buildings are permitted near transmission lines, but are generally prohibited within the ROW itself because a structure under a transmission line may interfere with safe operation. For example, a fire in a building located in the ROW could damage a transmission line.

Magnetic Fields

Table 5.2-6 provides calculated magnetic fields for each structure and conductor configuration proposed for the project. Magnetic fields were calculated for each section of the project and

under two system conditions; the expected peak and average current flows as projected for the year 2011, under normal system intact conditions. Current is given in amps. The peak magnetic field values are calculated at a point directly under the transmission line and where the conductor is closest to the ground. The same method is used to calculate the magnetic field at varying distances from the alignment of the structure. The magnetic field profile data show that magnetic field levels decrease rapidly (inverse square of the distance from source) from the alignment.

Because the magnetic field produced by the transmission line is dependent on the current flowing on its conductors, the actual magnetic field when the project is in service is typically less than that shown in the table. This is because the calculations in the tables represent the magnetic field with current flow at expected normal system peak conditions. Actual current flow on the transmission line would vary as magnetic field changes throughout the day and would be less than peak levels during most hours of the year.

Table 5.2-6. Calculated Magnetic Fields (milligauss) for proposed double circuit 345 kV Transmission Line Designs (3.28 feet above ground)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline												
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	Peak	264	0.79	1.67	5.62	8.70	14.36	23.45	31.89	29.76	17.92	10.19	6.26	1.65	0.72
	Average	158	0.47	1.00	3.36	5.21	8.60	14.03	19.08	17.81	10.73	6.10	3.75	0.99	0.43
Single Pole Davit Arm 345kV Single Circuit Vertical Config	Peak	264	0.86	1.97	7.12	11.10	18.17	27.45	25.55	16.04	9.86	6.41	4.42	1.48	0.71
	Average	158	0.52	1.18	4.26	6.65	10.87	16.43	15.29	9.60	5.90	3.84	2.64	0.88	0.42
Single Pole Davit Arm 345kV/345 kV Double Circuit with One Circuit In Service	Peak	264	0.71	1.48	4.43	6.43	9.89	16.09	25.62	27.50	18.18	11.10	7.11	1.97	0.86
	Average	158	0.43	0.89	2.65	3.85	5.92	9.63	15.33	16.46	10.88	6.64	4.25	1.18	0.52
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	Peak	264	0.19	0.58	3.32	6.08	11.96	22.90	30.03	23.06	12.10	6.17	3.39	0.59	0.19
	Average	158	0.11	0.35	1.99	3.64	7.16	13.71	17.97	13.80	7.24	3.70	2.03	0.35	0.12

Predicted magnetic field strengths range from 32.89 to 68.35 milligauss at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 5.2-2.

Although the line would be built with double circuit capable poles, only a single circuit would be installed for this project. Electric and magnetic fields are lower for a double circuit configuration than for a single circuit configuration. The lower predicted values for a double circuit configuration results from a cancellation effect when two circuits on a single structure are designed to operate under opposite phases. Based on the proposed design and operation of the project, no impacts are anticipated due to EMF.

Stray Voltage

The primary concern with stray voltage has been its potential effect on farm animals that are confined in areas where electrical distribution systems supply the farm. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Electrical current flowing between the neutral wire and ground is a normal part of electrical systems. Stray voltage problems are most often the result of the system not operating properly. This abnormal condition leading to stray voltage can be caused by poor grounding conditions, inadequate connections, lightening strikes, or undersized neutral conductors. Issues with stray voltage can also arise in circumstances where transmission lines are directly over or parallel to the electric distribution system serving the farm. Stray voltage can cause impacts to dairy farming operations and milk production. Issues are typically related to the distribution and service lines directly serving a farm or wiring on a farm. Issues with stray voltage can arise in circumstances where transmission lines are directly over or parallel to the electric distribution system serving the farm.

Health Effects

Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/ defibrillators, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices (Wisconsin PSC, 2009)

Older unipolar designs are more susceptible to electric field interference. Research completed by Toivonen et al. (1991) indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types does exceed levels that Toivonen et al. has indicated may produce interference. However, a recent paper (Scholten et al., 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

There would be no anticipated permanent impacts on implantable medical devices as a result of the project.

5.2.3 Mitigation

Electromagnetic Fields

There are no anticipated impacts attributed to EMF from the project, therefore, mitigation would not be needed. However, three primary methods to reduce EMF exposure for the project are explained below.

Magnetic field exposure is directly related to distance from the transmission line, therefore, as indicated in the route permit application, the applicants have selected route options and designs in part to avoid residences to the greatest possible extent. Also, the proposed ROW and the structures can be designed to help minimize EMF exposure.

The configuration and distance between transmission line phases has an impact on EMF exposure. The amount of EMF exposure is reduced when the phases are compacted. The applicants could consider compacted structure designs where feasible.

Phase cancellation significantly reduces EMF from transmission lines. For the double-circuit lines, rearranging phase conductors may help to reduce magnetic field strength. The applicants could consider these options during the detailed project design phase.

Stray Voltage

Mitigation of potential stray voltage impacts would include that all safety requirements are met during the construction and operation of the project. Appropriate measures could be taken to prevent stray voltage problems when the transmission lines proposed in this project parallel or cross distribution lines. Where possible, such crossings or parallel alignments would be avoided.

Health Effects

There are no anticipated health effects or impacts expected from the project, including implantable medical devices, therefore, mitigation would not be needed.

5.3 RECREATION AND AESTHETIC RESOURCES

This section discusses recreation and aesthetic resources in the project area between North Dakota and Alexandria and the potential impacts on these resources. Aesthetic resources are the various elements of the landscape that contribute to the visual character of a place. The visual context of a setting is related to both the natural and built environment, and transmission lines alter this context. Recreational resources in the project area from North Dakota to Alexandria include: Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), lakes, local and regional trails, and other recreational uses.

5.3.1 Affected Environment

Recreation Land

Recreational uses occurring within or adjacent to the Applicant Preferred Route include campgrounds and other non-private sensitive management areas or areas generally hosting

various types of conservation such as existing federal WPAs and state WMAs. Recreational uses occurring within or adjacent to Route A include federal WPAs and state WMAs, campgrounds, and boat launches. Lakes scattered throughout Otter Tail, Grant, and Douglas counties host a variety of recreational opportunities for fishing, boating, and swimming. Alexandria is surrounded by a chain of lakes and interconnected natural waterways that offer boaters access to more than 20 miles of water and fishing for a variety of species.

Various campgrounds occur along the Applicant Preferred Route. Lands generally grouped as recreational use areas, which would include local parks and open space, occur within the counties and incorporated communities affected by the Applicant Preferred Route and Route A.

WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. State WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses. Table 5.3-1 shows the area of parks, open space, and recreation land within each route corridor according to zoning data.

Table 5.3-1. Recreational Land Use Within Each Route and Route Options

Route	Parks/Open Space/Recreation within proposed Route (Acres)
Route Alternatives	
Applicant Preferred Route	1,122
Route A	561
Route Options	
Option 1	0
Option 2a	58
Option 2b	290
Option 3	236
Amended Scope Options	
Option AS-1	0
Option AS-2	0
Option AS-3	0

The Applicant Preferred Route includes twice as much recreation land use as Route A.

Trails

Recreational uses occurring within or adjacent to the Applicant Preferred Route and Route A include local trails and the Central Lakes Trail. The Central Lakes Trail (CLT) is a 55-mile paved trail between Fergus Falls and Osakis. The CLT begins at the southeast edge of Fergus Falls and ultimately connects to the Lake Wobegon Trail; which extends from Osakis to St. Joseph (48 miles) and also to Holdingford. An additional connection from the Lake Wobegon Trail to the Morrison County Trail has been completed. This results in a total paved trail length of

approximately 130 miles. The trails generally parallel Interstate 94 to the north. Refer to Appendix H for maps of recreational resources.

Scenic Byways

Several scenic and recreational resources are located in the project area including three scenic byways. The three designated scenic byways occurring in the vicinity of the Applicant Preferred Route include the King of Trails, the Otter Trail, and Glacial Ridge Trail. The King of Trails follows historic U.S. Highway 75 crossing the entire United States, starting in Winnipeg, Manitoba, and ending at the Gulf of Mexico in Galveston, Texas. The Otter Trail scenic byway includes various state highways that comprise a 150-mile loop meandering north, east, and southeast of Fergus Falls. The Glacial Ridge Trail scenic byway includes various state and county highways that comprise a 245-mile loop meandering south from both Alexandria and Sauk Centre.

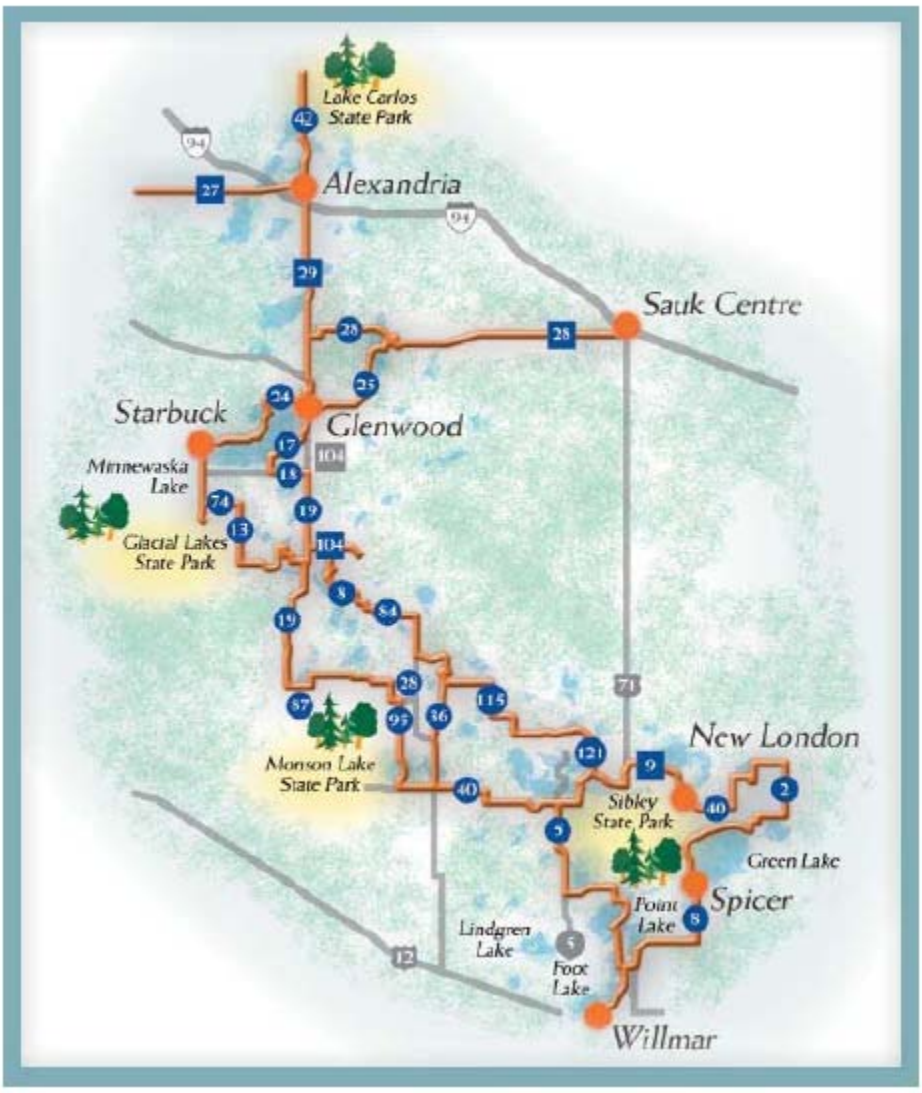
Diagram 5-1. Otter Trail Scenic Byway

http://minnesotascenicbyways.com/otterTrail.html

Diagram 5-2. King of Trails Scenic Byway

http://minnesotascenicbyways.com/kingOfTrails.html

Diagram 5-3. Glacial Ridge Trail



http://minnesotascenicbyways.com/glacialRidgeTrail.html

Aesthetics

The visual character and quality in the project area are characterized by its surrounding landscape. The western portion of the project area is bordered by the Bois de Sioux River which joins the Red River to define the border between Minnesota and North Dakota. The topography in the project area is flat to rolling terrain. The regional landscape is characterized by flat former lake bed dominated by row crops and grains between the border and Fergus Falls and elevated knob and kettle landscape with many lakes and a mix of forest, row crops, and pasture from Fergus Falls to Alexandria (EPA, 2007). As the routes travel east into Otter Tail County, Grant County and Douglas County a multitude of various sized lakes dot the landscape. Land uses associated with the routes are dominated by agricultural uses, characterizing the regional setting as mostly rural around dispersed population centers.

Open space, recreational areas, and other non-private sensitive management areas or areas generally hosting various types of conservation provide for a variety of viewing areas along the routes. Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the project, or would otherwise be visually exposed to the project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

Residential uses occurring within and along the Applicant Preferred Route include dispersed rural residential uses and residential uses occurring within or near incorporated communities. Residences having an unobstructed line of sight of the proposed 345 kV electrical transmission line would view the line. The distance between these residences and the line would also dictate the field of view, for example, a foreground or background view.

The Applicant Preferred Route parallels existing transportation and utility rights-of-way (in accordance with Minn. R. 7850.4100), both generally considered pre-disturbed in nature, for most of its length. Generally, the Applicant Preferred Route is located in a built environment. Motorists along any roadways which the Applicant Preferred Route parallels would view the transmission line. Although traffic volumes are typically highest when associated with major roads such as Interstate 94, U.S. highways, and state highways, motorist views may be considered more intermittent in that these roadways typically do not support local traffic. Local secondary roads of which the Applicant Preferred Route parallels generally support motorists who use these roads more regularly or repeatedly. Additionally, while the Interstate 94 corridor itself is a pre-disturbed right-of-way that is regularly maintained, Mn/DOT has obtained scenic easements at various locations along Interstate 94.

Route A does not follow major existing infrastructure and is generally along property lines or local roadways.

5.3.2 Potential Impacts

This section presents the potential impacts the project could have on recreation resources and aesthetics. Further, if impacts may occur, potential mitigation is discussed. Both the Applicant Preferred Route and Route A would impact recreational resources similarly. There are no federal, state, or county parks or Wild and Scenic River Districts in the proposed routes. However, the proposed routes would cross the Bois de Sioux River which joins the Red River to define the border between Minnesota and North Dakota. The number of trail crossings by each route was calculated, and campgrounds, historical markers, and wayside rest areas within each route and ROW were identified. Scenic byways within one mile of the proposed routes and any byway crossings were also identified. WPAs, WMAs, and scenic byways were analyzed to determine if they were present within one mile of the proposed routes.

Recreation Land

Tables 5.3-2 and 5.3-3 show the amount of recreational land use that would be impacted by the route alternatives and the route options. The Applicant Preferred Route impacts more

recreational resources due to proximity to the transmission line than Route A, but neither route would limit or change the function of any recreation resources. The Applicant Preferred Route includes more land use designated as recreational/park than Route A.

Route Options 2a and 2b would impact less land designated as recreational/park than the Applicant Preferred Route with Option 2a impacting the least amount of land use designated for recreational/park.

Table 5.3-2. Recreational Land Use Within Each Route and Route Option

Route	Parks/Open Space/Recreation within proposed Route (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	117
Applicant Preferred No ROW Occupancy	128
Route A	87
Route Options	
Option 1 s	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 1	0
Option 2 s	
Applicant Preferred ROW Occupancy	44
Applicant Preferred No ROW Occupancy	44
Option 2a	10
Option 2b	33
Option 3s	
Applicant Preferred ROW Occupancy	17
Applicant Preferred No ROW Occupancy	17
Option 3	40
Amended Scope Options	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option AS-1	0
Option AS-2 ROW Occupancy	0
Option AS-2 No ROW Occupancy	0
Option AS-3	0

The Applicant Preferred Route includes a wayside rest area located on the eastbound side of Interstate 94 south of Fergus Falls on Iverson Lake. Additionally, two historical markers/wayside rest areas located adjacent to Interstate 94 would be in the Preferred Alternative Route. The Steamboats on the Red River Historical Marker/wayside rest area is on the westbound side of Interstate 94 north of the Otter Tail County Border near Clear Lake. The

Minnesota Watershed Historical Marker/wayside rest area is located off of the eastbound travel lanes of Interstate 94 west of Alexandria near Lake Latoka.

The Applicant Preferred Route includes the southern half of the Prairie Cove Campground and RV Park at the northeast intersection of Interstate 94 and State Highway 78 west of Pelican Lake. Twenty-six WPAs, seven WMAs, and one SNA are within one mile of the Applicant Preferred Route from North Dakota to Alexandria.

Seventeen WPAs, seven WMAs, and two scenic byways are within one mile of Route A from North Dakota to Alexandria. Refer to Appendix H for maps of recreational resources.

Option 1 impacts two additional WPAs and within one mile of a 1,000-foot route.

Option 2a impacts one additional WPA and one additional WMA within one mile of a 1,000-foot route. Option 2b impacts one additional WPA and one additional WMA within one mile of a 1,000-foot route.

The Option 3 route diversion from the Applicant Preferred Route travels south from Interstate 94 and turns east towards Alexandria on State Highway 27. The Maryview Beach Resort is located on the south side of State Highway 27 adjacent to the Option 3 ROW on the north end of Lake Mary.

Trails

As shown in Table 5.3-1, the Applicant Preferred Route crosses several local snowmobile and multi-use non-motorized trails. These trails are often associated with existing local roadways and provide access along roadway ROWs. The Applicant Preferred Route crosses the Clay Trail Alliance, Otter Country Trails, Low Plains Drifters Trail, and the Douglas Area Trails Association Trail system. The Douglas Area Trails Association Trail follows the westbound side of Interstate 94 for a short distance west of Brandon and Garfield and is within the Applicant Preferred Route. Table 5.3-3 shows the number of trails crossed by each route corridor.

Table 5.3-3. Trail Impact Evaluation: Routes and Route Options

Routes and Options Affected	Trail Crossings				
	Clay Trail Alliance	Otter Country Trails	Low Plains Drifters Trail	Douglas Area Trails Association Trail system	West Central Trail Blazers Trail
Route Alternatives					
Applicant Preferred	2	1	1	2	-
Route A	-	-	6	1	2
Option 1					
Applicant Preferred ROW Occupancy	-	-	-	-	-
Applicant Preferred No ROW Occupancy	-	-	-	-	-
Option 1	-	-	-	-	-
Option 2					
Applicant Preferred ROW Occupancy	-	-	1	-	-
Applicant Preferred No ROW Occupancy	-	-	1	-	-
Option 2a	-	-	1	-	-
Option 2b	-	-	1	-	-
Option 3					
Applicant Preferred ROW Occupancy	-	-	-	-	-
Applicant Preferred No ROW Occupancy	-	-	-	-	-
Option 3	-	-	-	-	-
Amended Scope Options					
Applicant Preferred ROW Occupancy	1	-	-	-	-
Applicant Preferred No ROW Occupancy	1	-	-	-	-
Option AS-1	1	-	-	-	-
Option AS-2 ROW Occupancy	1	-	-	-	-
Option AS-2 No ROW Occupancy	1	-	-	-	-
Option AS-3	-	-	-	-	-

Source: Billig, Jim. Central and Northwest Minnesota All-Outdoors Atlas. 2007.

Route A parallels the Low Plains Drifters Trail for a short distance and crosses it multiple times. Route A also crosses the West Central Trail Blazers Trail and the Douglas Area Trails Association Trails multiple times. The Option 2a diversion from the Applicant Preferred Route

crosses the Low Plains Drifter Trail but so does Option 2b and the Preferred Route ROW Occupancy and No Occupancy alignments at a different location.

AS-1 and AS-2 cross one Clay Trail Alliance Trail similar to the Applicant Preferred Route, however both the Preferred Route and AS-2 also parallel a Clay Trail Alliance Trail for approximately three miles between the North Dakota border and County State Aid Highway 7.

Both routes cross snowmobile and multi-use non-motorized trails. Many of these trails are associated with roadway ROW therefore they are already in the built environment. The Applicant Preferred Route crosses six trails and Route A crosses nine trails. The Route Option 2a would add an additional trail crossing to the Applicant Preferred Route. Finally, AS-1 would have fewer impacts on trails than the AS-2 and Preferred Alternative alternates.

Scenic Byways

Impacts to the designated scenic byways occurring in the vicinity of the Applicant Preferred Route would be limited to crossing the King of Trails and the Glacial Ridge Trail. The Otter Trail scenic byway is east of the Applicant Preferred Route at a distance of at least 1.5 miles and is not located near Route A. The Applicant Preferred Route crosses the King of Trails Scenic Byway, which follows U.S. Highway 75, near the intersection of U.S. Highway 75 and County Road 8 in Clay County. Route A crosses the King of Trails Byway south of Doran and intersection of U.S. Highway 75 and County Road 9 in Wilkin County.

The Applicant Preferred Route also crosses the Glacial Ridge Trail near the intersections of Interstate 94 and State Highways 27 and 29 south of Alexandria in Douglas County.

Rather than crossing the Glacial Ridge Trail Byway, Option 3, route option for the Preferred Alternative, would parallel a portion of the byway on State Highway 27 for approximately two miles before rejoining the Preferred Alternative Route.

Visual Impacts and Aesthetics

The project, from Fargo to St. Cloud, extends diagonally from North Dakota to Alexandria. Similarly, Interstate 94 runs diagonally from the Fargo area to Alexandria northwest to southeast. Throughout the route development process, Applicants have sought to identify areas to share rights-of-way with existing infrastructure, including roads, railroads, and existing transmission corridors. The proposed transmission line will likely affect visual resources within close proximity of the line. The proposed line will be constructed primarily on single-pole, double circuit capable, self-weathering or galvanized steel structures.

Diagram 5-4. Representative 345 kV Double Circuit Single Pole Structure (Self-Weathering)

Both the routes and the route options require corner structures needed for right-angle turns in the line. Where angle structures are required at 90 degree turns for the line the linear nature of the facility will be broken and this interruption will make a greater visual impact than tangent structures.

In general, structures would have drilled pier concrete foundations (Diagram 5-5). Drilled pier foundations may vary from six to nine feet in diameter and 25 or more feet deep, depending on soil conditions.

Diagram 5-5. Pier Foundation

Visual resources would be impacted by the introduction of the proposed 345 kV transmission line into the regional landscape. The transmission line would introduce new vertical forms or lines in areas where it would not otherwise parallel an existing transmission line. Since the area is largely rural, the proposed 345 kV line may introduce color contrasts during some lighting conditions or seasons. In addition to the proposed single pole steel structures, establishment of the required right of-way may alter color and textural contrasts as a result of vegetation removal. Vegetative tree species and some shrub species will be permanently removed within the right-of-way. The vegetation clearing necessary for construction and operation may create a dramatic change in the ROW cover in some areas.

In flat or rolling terrain, which is common in the area traversed by the routes, structures can be visible at distances greater than a mile. In the context of agricultural lands the pole structures would be visible from distances of up to two miles. The average height of 130-175 feet makes the new facility visible in the local communities and generally in the landscape. Transmission lines are likely to be seen only at distances up to three quarters of a mile at the most. The greatest visual impact would be in the Interstate 94 viewshed and agricultural landscape.

Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the project, or would otherwise be visually exposed to the project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

The Applicant Preferred Route and Route A impact aesthetics similarly. Sensitive viewpoints along each route would be similar. Route A, however, parallels property lines and secondary roads, and in some locations would extend cross-country along no specific linear feature, whereas the Applicant Preferred Route parallels a pre-disturbed major transportation corridor for most of its length. Both routes impact aesthetics similarly. The types of sensitive viewpoints along Route A would be similar to those occurring along the Applicant Preferred Route. Route A, however, parallels property lines and secondary roads, and in some locations would extend cross-country along no specific linear feature, whereas the Applicant Preferred Route parallels a pre-disturbed major transportation corridor for most of its length. Although the proposed 345 kV transmission line will introduce a new vertical form, line, color, and contrast in some areas, the proposed routes attempt to maximize the use of existing, pre-disturbed rights-of-way and minimize the proximity to existing residences to the greatest extent practicable. Placing transmission lines along existing infrastructure is intended to minimize the introduction of new elements into undisturbed landscapes or homogeneous landscapes. Sensitive viewpoints along the Route Options and the potential for impact to visual resources as it relates to these viewpoints would be similar to those described above for the Applicant Preferred Route.

Residences within 500 feet of the alignments and within the proposed 150-foot ROW are presented in the Tables 5.3-4 and 5.3-5.

Table 5.3-4. Aesthetic Impact Evaluation for Route Alternatives and Route Options

Route	Homes	
	Within 500' of Alignment	Within 150' of Alignment
Route Alternatives		
Applicant Preferred ROW Occupancy	70	0
Applicant Preferred No ROW Occupancy	73	0
Route A	70	0
Option 1		
Applicant Preferred ROW Occupancy	1	0
Applicant Preferred No ROW Occupancy	1	0
Option 1	3	0
Option 2		
Applicant Preferred ROW Occupancy	13	0
Applicant Preferred No ROW Occupancy	9	0
Option 2a	3	0
Option 2b	5	0
Option 3		
Applicant Preferred ROW Occupancy	6	0
Applicant Preferred No ROW Occupancy	10	0
Option 3	69	0
Amended Scope Options		
Applicant Preferred ROW Occupancy	17	0
Applicant Preferred No ROW Occupancy	17	0
Option AS-1	4	0
Option AS-2 ROW Occupancy	22	0
Option AS-2 No ROW Occupancy	22	0
Option AS-3	0	0

There are no homes within the proposed 150-foot ROW. The number of homes within 500 feet of the proposed routes is similar which suggests the same number of homes would directly view the line. Between North Dakota and Alexandria, there are 70 homes within 500 feet of the Applicant Preferred Route under the ROW occupancy scenario and 73 homes within 500 feet of the Applicant Preferred Route under the no ROW occupancy scenario. There are 70 homes within the within 500 feet of the Route A alignment. Route Option 1 would have two additional homes within 500 feet of the Preferred Route alternatives. Route Option 2a and 2b would have fewer homes within 500 feet than the Preferred Route alternatives. Route Option 3 would have a significantly greater number of homes within 500 feet than the Preferred Routes. Finally, AS-1 would have fewer homes than the Preferred Route alternatives within 500 feet but AS-2 would have a greater number of homes within 500 feet.

Between North Dakota and Alexandria the routes impact homes similarly but the Applicant Preferred Route and Option 3 in particular would have greater impacts on scenic byways. AS-2 would have greater impacts on the King of Trails Scenic Byway than AS-1 and the Preferred Route ROW Occupancy and No ROW Occupancy alignments because it parallels the byway for approximately two miles before turning east to parallel Interstate 94.

The Applicant Preferred Route includes three wayside rest areas and a campground. The transmission lines would have visual impacts on these areas but would not limit their function. The Applicant Preferred Route includes twenty-six WPAs within one mile of the route while Route A includes seventeen. Both routes include seven WMAs within one mile of the routes. The transmission line may be visible from these resources but would not limit or change their function. The Applicant Preferred Route Options 1, 2a, 2b, and 3 include one to two additional WPAs within one mile of the route and Options 2a and 2b would also include one additional WMA. Option 3 would create additional visual impacts on a resort area and an existing scenic byway. The Amended Scope options would not include any additional WMAs or WPAs within one mile than those already located within one mile from the Preferred Route ROW Occupancy and No ROW Occupancy options.

No impacts on recreational uses that would alter or limit the use of these areas are anticipated, and therefore, no mitigative measures are proposed.

5.3.3 Mitigation

Based on a viewer's response and sensitivity, the presence of transmission lines can detract from the visual attractions of an area. Wherever possible, the proposed transmission lines could be routed alongside existing power lines and section lines, as well as within road, rail, and utility ROWs, to minimize any adverse impacts.

The transmission line would contrast with surrounding land uses, therefore landowners could be consulted to identify any concerns related to the project and visual aesthetics.

Generally, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Mitigation measures would not vary between alternative routes. Potential Mitigation measures could include the following.

- The placement of structures could allow the maximum feasible distance between residences within the limits of the structure design.
- Final structure locations, ROW, and any disturbed areas could be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Consideration could be made to preserve the natural landscape; construction and operation could be conducted to prevent unnecessary destruction, scarring, or defacing of the adjacent natural setting in the vicinity of the project.
- Undergrounding the transmission line.

- To the extent possible, transmission lines could parallel existing transmission lines and existing ROWs without violating sound engineering principles or system reliability criteria.
- Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design.
- Along existing roadways, transmission line alignments could be placed at locations with the fewest impacts to existing ROW.
- Visual screening with vegetation could be considered in the foreground where the route parallels scenic byways but due to the height of the structure and the transmission lines may still be visible in the background.
- No impacts on scenic or recreational waterways are anticipated as a result of any of the substation sites, and therefore, no mitigative measures are proposed.
- River crossing would occur in the same location as existing transmission lines.
- Undergrounding versus aerial river crossings could be considered.

5.4 TRANSPORTATION

This section discusses potential impacts and mitigation on local roadways and highways and airports in the area of the project. Paralleling roadways reduces the need for additional right of way. Under the routes evaluated for this project, transmission lines would parallel and cross roads including township roads, county roads, county highways, state highways, and one interstate highway. Impacts can be anticipated when the transmission line crosses over a roadway, runs parallel to a roadway in close proximity such that roadway safety and maintenance activities are potentially affected, or when local or state government expands existing roadways and utility poles require relocation.

5.4.1 Affected Environment

Each of the route alternatives pass through a roadway network consisting of various interstate, state, county, city and other local roadways (Appendix H). Many of the roadways in the area are low volume roadways that primarily serve farm to market functions. The counties of Clay, Douglas, Grant, Otter Tail, Pope, Stearns, Todd, Traverse, and Wilkin have responsibility for the operation and maintenance of their respective systems of county roadways. These roadways include county state-aid highways and county roads. Mn/DOT also has responsibility for planning and funding roadway improvements, including interstate highways, U.S. highways, and state trunk highways.

Roadways

Table 5.4-1 lists the main roads that the Applicant Preferred Route would follow and traffic data, if available, for those roads.

Table 5.4-1. Average Annual Daily Traffic for Selected Roads Parallel to the Applicant Preferred Route

Applicant Preferred Route	Existing Average Annual Daily Traffic	Parallel Length (miles)
Interstate 94	12,600 to 15,900	73
Sethney Lane	NA	0.4
Kenworth Drive Northwest	NA	0.5
CSAH 41	1,100	0.5
CSAH 82	2,750	0.4
CSAH 19	195	0.7
County Road 63	55	6.9
CSAH 8	200	6.4

Source: Minnesota Department of Transportation, 2006-2007.
NA: Traffic data is not available for this roadway segment.

There are three full-service rest areas along Interstate 94 in the North Dakota to Alexandria section that may be affected by the Applicant Preferred Route. The Lake Latoka rest area (for eastbound traffic) is located 1.15 miles northwest of Highway 27 in Douglas County. The Hansel Lake rest area (for westbound traffic) is located in Otter Tail County approximately 0.4 mile southeast of the U.S. Highway 59/Interstate 94 intersection. The Lake Iverson rest area (for eastbound traffic) is located 8.0 miles southeast of Fergus Falls in Otter Tail County (Mn/DOT, 2009b).

Table 5.4-2 lists the main roads that Route A would follow and traffic data, if available, for those roads.

Table 5.4-2. Average Annual Daily Traffic for Selected Roads Parallel to Route A

Route A	Existing Average Annual Daily Traffic	Parallel Length (miles)
County Road 21	850	4.1
County Road 4	400	0.5
State Highway 114	740	1.0
Lake Olaf Road SW	NA	1.8
County Road 11	210	8.6
County Road 5	465	2.1
County Road 37	145	2.8
Township Highway 176	NA	1.0
County Road 38	80	2.6
State Highway 55	1,850	2.4
Township Highway 148	NA	1.7
Township Highway 31	NA	1.0
County Road 2	180	0.5
County Road 47	25	3.9
County Road 1	365	3.5
County Road 11	445	1.0
County Road 42	45	5.0
Township Highway 93	NA	2.0
Township Highway 129	NA	6.2
State Highway 9	520	9.3
County Road 156	305	6.2

Source: Minnesota Department of Transportation, 2006-2007.
NA: Traffic data is not available for this roadway segment.

Table 5.4-3 lists the main roads that Route Option would follow and traffic data, if available, for those roads which are shown in Appendix H.

Table 5.4-3. Average Annual Daily Traffic for Selected Roads Parallel to Route Options

Route Options	Existing Average Annual Daily Traffic	Parallel Length (miles)
Option 1		
CSAH 4 (Grant)	240	0.8
CSAH 24	65	1.0
County Road 52	40	0.5
County Road 52	80	1.5
Option 2 *		
County Road 52	70	0.2
State Highway 79	1,050	1.0
CSAH 25 (Douglas)	125	1.0
Sunny Side Drive NW	NA	3.5
Option 3		
Englund Drive SW	NA	0.2
State Highway 27	5,300	1.0
Option AS 1		
140th Avenue	30	15
Option AS-2		
140th Avenue	30	1.5
U.S. Highway 75	1,200	3.0
CSAH 8	200	12.0
Interstate 94	15,600	4.5

**Roads associated with Option 2b. No roads are located in Option 2a.*

Option 1 is approximately 4 miles in length and deviates from the Applicant Preferred Route. Option 2a is the portion of the Applicant Preferred Route Alternative within Option 2. Option 2b is approximately 9 miles in length and deviates from the Applicant Preferred Route.

Option 2c is approximately one mile in length and is an alternative connection along Green Acres Road NW between Kenworth Drive on the Applicant Preferred Route and Sunny Side Drive NW on Route Option 2b). Option 3 is approximately 4 miles in length and is an alternative connection from Interstate 94 along Englund Drive SW for 2.0 miles and State Route 27 for 3 miles back to Interstate 94.

Amended Scope (AS) Option 1 is approximately 15 miles in length and deviates from the Applicant Preferred Route near Interstate 94 and 140th Avenue in Clay County. AS Option 1 runs in an east-west direction, parallel to 140th Avenue, until it reaches the Red River.

AS Option 2 includes a small portion of AS Option 1 from the Red River to U.S. 75. AS Option 2 runs in a north-south direction along U.S. 75 between 140th Avenue and the Preferred Route.

AS Option 2 then runs along the Applicant Preferred Route (parallel to CSAH 8) until it intersects with Interstate 94.

AS Option 3does not have the potential to affect any additional roadways.

Airports

HVTLs can present an important safety concern to airports and aircraft. An airport, whether public or private, is defined by the state and the Federal Aviation Administration (FAA) as an area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any. 14 C.F.R. Part 1, §1.1 and Minn. R. 8800.0100, Subp. 3. The placement of transmission line structures or the stringing of conductors between structures could impact the safe operation of an airport or hinder the maneuverability of aircraft. If close enough, the presence of a steel transmission line structure or wiring could interfere with the operation of air navigation or weather systems.

The physical dimensions of airport runways determine the class size of aircraft capable of landing at an airport. Furthermore, the aircraft design and propulsion system are determinants in an aircraft's ability to land at a given facility. For example, jet aircraft are heavier, typically require a greater runway length for take-off and landing, and require more glide slope clearance distance compared to propeller-driven aircraft. Both of these factors are important in relation to structures such as transmission lines because they determine the take-off and landing glide slopes necessary for safe flight operation, which in turn determine the setback distance of structures such as transmission lines.

The FAA and Mn/DOT have established development guidelines on the proximity of structures, including HVTLs, to public use airports and heliports. Federal Aviation Regulation (FAR) Part 77 establishes standards and notice requirements for reporting airspace obstructions for objects currently impacting or that could impact navigable airspace around aviation facilities. FAR Part 77 defines a series of imaginary surface zones surrounding airports that specify height restrictions for structures based on slope ratios. These imaginary surfaces include the primary surface, horizontal surface, conical surface, approach surface, precision instrument approach surface, and the transitional surface. According to FAR Part 77, "an object will be considered an obstruction to a public airport (excluding seaplane bases and heliports) if it is of greater height" than any of the aforementioned imaginary surfaces. Each of these imaginary surfaces have corresponding slopes, based in part on the airports' use designation, flight volumes, and plane size capabilities. All surfaces are measured at the mean sea-level elevation of the airport. If necessary or appropriate, Applicants will file the required notice with FAA pursuant to the requirements set forth by FAR Part 77, Subsection 13.

In addition to FAA regulations, the state of Minnesota establishes air navigation obstruction criteria under Minn. R. Ch. 8800. These regulations are intended to control the type of development around airports to prevent incompatible land uses. The state regulations are similar to the FAA regulations as published in FAR Part 77. State runway Safety Zones A through C, which follow the runway approach zones and restrict specific types of development, are included as this part of these regulations. The most restrictive safety zones are A and B. Safety Zone A does not allow any buildings or temporary structures, places of public assembly or transmission

lines; Safety Zone B does not allow places of public or semipublic assembly (i.e., churches, hospitals, or schools).

Permitted land uses in both zones include agricultural uses, cemeteries, and parking lots. A complete description and copy of the Minn. R. Ch. 8800 Department of Transportation Aeronautics Section 2400 Airport Zoning Standards can be found at http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html.

Furthermore, certain objects such as steel pole transmission line structures have the potential to conflict with the operation of airport navigational aids and weather observation station facilities. Specifically, these facilities include Very High Frequency Omnidirectional Radio Range (VOR) air navigation systems and Automated Weather Observation Stations (AWOS). FAA Order 6820.10 "VOR, VOR/DME, and VORTAC Siting Criteria," specifies the distance setback requirements for trees, buildings, and metallic structures. Within this order, obstruction criteria for a VOR facility are identified, in addition to setback distances for transmission line structures. These regulations specify that overhead transmission line structures with conductors should be located beyond 1,200 feet of the VOR antenna to avoid communication interference. Additionally, metallic structures are required to subtend vertical angles of 1.2 degrees or less, measured from the ground elevation of the VOR facility. As applied here, structures of 130 feet in height must be 6,206 feet away from a VOR air navigational station to avoid interference with the operation of the facility. Transmission structures of 140 feet in height must be 6,683 feet away and transmission structures of 175 feet in height must be 8,354 feet away from a VOR.

5.4.2 Potential Impacts

The primary impacts related to roadways involve compatibility with roadway expansion plans, safety requirements, and temporary construction impacts.

Roadway ROW and Expansion Plans

The applicants have indicated that a 150-foot wide ROW (easement) would be required for the proposed transmission line. Specialty structures may be required for long spans or in environmentally sensitive areas. In these cases, a ROW of up to 180 feet may be required. When a transmission line is placed entirely across private land, an easement for the entire 150-foot to 180-foot-wide ROW would need to be acquired from the landowner(s). The applicants have indicated they would locate the poles as close to property division lines as reasonably feasible to reduce the amount of ROW impact on a particular property.

When paralleling roadways, the applicants plan to install poles just outside the public roadway ROW. Placement of poles would typically range from 25 feet to 75 feet into fields or other private property when possible. Thus, although the pole is still located on private property, the transmission line can occupy some of the public ROW, thereby reducing the size of the easement required from the private landowner. For example, if the required ROW is 150 feet, and the pole is placed twenty-five feet off of an existing road ROW, then a 100-foot easement would be required from the landowner. The transmission line ROW would occupy a 50-foot-wide section of roadway ROW. By keeping the poles at least 25 feet from the roadway ROW,

the potential for having to relocate utility poles due to future roadway expansions is reduced. See Diagrams 1-1 through 1-3 for examples of these scenarios.

In order to occupy roadway ROW, the applicants would need to acquire necessary approvals from the owner or the agency (e.g., Mn/DOT). Mn/DOT's Utility Accommodation Policy outlines the policies and procedures governing use and collocation of state trunk highway ROWs by utilities. The policy was developed in accordance with the requirements of state and federal law (Code of Federal Regulations, Title 23, Part 645, Subpart B). It is designed to ensure that the placement of utilities does not interfere with the flow of traffic and the safe operation of vehicles.

Mn/DOT has a responsibility to preserve the public investment in the transportation system and to ensure that non-highway uses of the ROW do not interfere with the ability of the state to make long-term highway improvements, such as adding lanes, interchanges, or bridges, or to safely maintain the existing system. In addition, state law requires Mn/DOT to reimburse the utility if a utility must be relocated from an ROW along an interstate highway as a result of future expansion or new interchanges.

Requirements vary based on whether the utility is crossing the highway or being installed parallel to it, and on the type of highway. For controlled access highways or freeways, Mn/DOT's Utility Accommodation Policy states: "The installation of new utility facilities shall not be allowed longitudinally within the right-of-way of any freeway, except in special cases under strictly controlled conditions." This means that the transmission structure–the poles and davit arms–must be completely outside of the ROW. For this project, this would mean placing a pole approximately 20 to 25 feet outside the right-of-way.

The Utility Accommodation Policy does provide for exceptions where special circumstances exist. If the highway is part of the National Highway System, the exception must be approved by the Federal Highway Administration and would be considered a federal action, meaning that the requirements of the National Environmental Policy Act must be met.

Future Roadway Improvement Projects

Mn/DOT State Transportation Improvement Program contains a list of programmed projects that have received funding for fiscal years 2010-2013 in the study area. The Mn/DOT Statewide 20-Year Highway Investment Plans: 2009-2028 contains descriptions of planned projects that may be implemented at a future date. These documents were reviewed to determine which programmed (funded) and planned projects may be impacted by the project alternatives. A summary of these projects in presented in Table 5.4-4 and illustrated in Appendix H.

Table 5.4-4. Programmed and Planned Projects Within Study Area.

Route	Project Area	Length (miles)	Description	Potential Route Impacts							
				Applicant Preferred	Route A	Option 1	Option 3	Applicant Preferred (AS-1)	Option AS-1	Option AS-2	Option AS-3
Interstate 94	Downer to State Highway 34	7.7	Resurface	X				X	X	X	
CSAH 1	Evansville to 3.1 miles south	3.1	Resurface	X							
State Highway 29	Interstate 94 to State Highway 55	11.7	Mill and Overlay	X	X						
TH 27	Alexandria	0.5	Capacity Improvements	X			X				
Interstate 94	Rothsay to Fergus Falls	13	Resurface	X							
State Highway 29	State Highway 29/ Interstate 94	0.5	Rehab two bridges over Interstate 94	X	X						

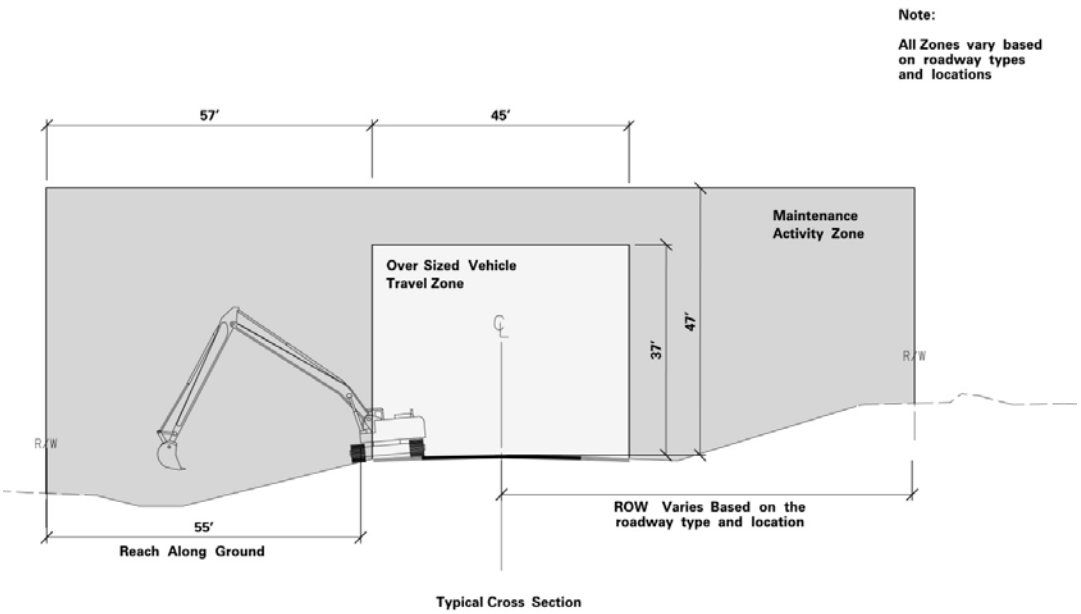
Roadway ROW and Safety Requirements

The poles must also be located a sufficient distance from the edge of the traveled roadways so as not to present a safety hazard. Most roadways have clear zones to provide a safety buffer between the roadway and adjacent land uses for errant vehicles. These areas may consist of a shoulder, a recoverable slope, a non-recoverable slope, or a clear run-out area. Requirements for clear zones and roadside obstruction vary based on traffic volume, design speed, roadside geometry, radius of horizontal curve, presence of a curb, and presence of urban or rural roads, collectors, arterials, or freeways. A brief review of clear zone requirements from state and federal manuals provides some guidance.

For very low-volume local roads, such as township roads, the American Association of State Highway and Transportation Officials state that, "at a location where a clear recovery area (an area free of hazards along the edge of a road) of two meters (six feet) or more in width which can be provided at low cost and with minimum social/environmental impacts, provision of such a clear recovery area should be considered." (AASHTO Green Book, 2001). However, they also state that where constraints make these impractical, clear recovery areas of less than two meters may be used. They also suggest consideration of other factors including the presence of vehicles wider than 2.6 m (8.5 ft) such as farm equipment.

The Mn/DOT Road Design Manual Part I and Part II, Chapter 4 (4-6(6)-4-6(20)) provides charts to determine clear zone widths based on speeds and side slope type. There are 11 different tables in this manual for determining clear zone widths based on daily traffic, cut or fill slopes, and design speed. In addition, the State of Minnesota also provides a formula for adjusting the clear zone on the outside of horizontal curves and a table for increasing clear zone widths when there are curbs greater than four inches. Given the complexity of roadway design, it is not appropriate to generalize about what is considered "safe" in regard to placing transmission line poles adjacent to roadways. The safe zone would have to be determined case by case. To obtain a general sense of this issue, Diagram 5-6 depicts a "zone of activity" as defined by Mn/DOT. In general, impacts to this zone should be avoided to minimize safety related issues associated with normal traffic operations.

Diagram 5-6. Mn/DOT Zone of Activity



The alternatives could have potential safety implications for roadway maintenance. Typical roadway and right-of-way maintenance activities, such as mowing, refuse and debris removal, and sign replacement and inspections may occur in close proximity to the transmission lines.

The presence of maintenance equipment and personnel near transmission lines may increase the risk of coming into contact with the transmission lines or arc flashes, especially from high temperatures, wind, and precipitation that cause sagging or blowouts.

Under certain wind conditions, the conductors could sway or "blow out" over the right-of-way. This type of blowout potential occurs when the wind essentially pushes the conductors sideways and up into the airspace above the right-of-way. Moisture and ice can also cause the transmission lines to sag to lower than normal heights.

The type of ROW occupancy option selected may have different impacts on these activities. The greater the amount of ROW occupancy, the greater the potential there is for safety impacts to

maintenance activities and personnel. A greater ROW occupancy (e.g. 75 feet versus 5 feet) may potentially place limits on how roadway and ROW maintenance activities are carried out.

The safe movement of oversized goods could potentially be impacted by the alternatives. I-94 from St. Cloud to Moorhead is designated as a Super haul corridor. Super haul corridors are characterized as routes that can handle a 16-foot height limit, a 16-foot width limit with and 8-foot wide axle, a 130-foot length limit, and a 235,000-pound weight limit. Mn/DOT is responsible for preserving the ability to accommodate these characteristics and improve upon them if feasible.

Temporary Construction Impacts

Most of the transportation related impacts due to the project would be from construction activities and would also be temporary in nature. Temporary access for the construction of the new transmission lines would require a 20-foot-wide access trail constructed within the transmission line ROW or by short spur trails from the existing road network to the ROW. In some situations, private field roads or trails would be used. Permission form the property owner would be obtained prior to accessing the transmission line route. New access roads may also be constructed when no current access is available or if the existing access is inadequate.

Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

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

It is estimated that construction of the transmission line and substation modifications would require 40 full-time employees with 25 devoted to transmission line construction and 15 to substation modifications. Part-time personnel may also be needed. Construction of the concrete foundations for the pole is estimated to require five to six concrete trucks. Given the small number of workers and construction vehicles, traffic disruptions would be minimal and localized.

Staging areas are usually established for the project, as well as temporary lay-down areas. Materials are delivered to staging areas and stored until they are needed. Any staging or temporary lay-down areas outside of the transmission ROW would require permission from the landowners through rental agreements.

Construction activities along the Preferred Route have the potential to impact future roadway projects. Programmed projects include a resurfacing project on Interstate 94 in Clay County between Downer and State Highway 34 (7.7 miles), a resurfacing project on CSAH 1 in Douglas

County from Evansville to 3.1 miles south (across Interstate 94), and a mill and overlay project for State Highway 29 in Douglas County from Interstate 94 to State Highway 55 (11.7 miles).

Construction activities along the Preferred Route have the potential to impact planned projects including a capacity improvement to TH 27 in Alexandria (0.5 miles), a resurfacing of Interstate 94 between Rothsay and Fergus Falls (13 miles), a resurfacing of Interstate 94 between Osakis to Alexandria (12 miles), and the rehabilitation/replacement of the two State Highway 29 bridges over Interstate 94 in Douglas County.

Impacts to roadway traffic flow during construction are expected to be minimal. Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic. Transportation related impacts associated with Route A are similar to those described above for the Preferred Route. Most of the impacts are primarily from construction activities and would be temporary in nature. New access roads may also be constructed when no current access is available or if the existing access is inadequate. Construction activities along Route A have the potential to impact future roadway projects. Programmed projects include a mill and overlay project for State Highway 29 in Douglas County from Interstate 94 to State Highway 55.

Transportation related impacts associated with Route Options 1, 2a, 2b, 2c, and 3 are similar to those described above for the Preferred Route. Most of the impacts are primarily from construction activities and would be temporary in nature. New access roads may also be constructed when no current access is available or if the existing access is inadequate. Construction activities along Option 2a and 2b have the potential to impact programmed projects including a resurfacing project on CSAH 1 in Douglas County from Evansville to 3.1 miles south (across Interstate 94). Construction activities along Option 3 have the potential to impact planned capacity improvements to State Highway 27 in Alexandria.

Airports

Several public and private-use airports are located within five miles of a route. Table 5.4-5 identifies these airports. Construction around private-use airports are not subject to FAA navigable airspace regulations, but use of these airports could be impacted by the placement of poles or conductors. The Lesmeister Flying Service operates a private aviation business located in T137 R47 S16. If PS1 were selected, the runway would be bisected by the new transmission line and could no longer be used. Construction near public-use airports may require filing an FAA construction notice.

Table 5.4-5. Public and Private-Use Airports within 5 Miles of a Route

Airport	Facility Use	Preferred Route	Route A	Option 1	Option 2a	Option 2b	Option 3	AS-1	AS-2	AS-3
Angen Field	Private	X								
Barnesville Municipal	Private	X						X	X	
Blue Sky	Private	X							X	
Brutlag Farms	Private		X							
Carlson Ag	Private		X							
Chandler Field	Public	X	X				X			
Douglas County Hopsital	Private	X	X				X			
Elbow Lake Municipal	Public		X							
Ellig Field	Private	X						X	X	
Elmer	Private	X			X	X				
Fergus Falls Municipal	Public	X								
Janssen	Private	X						X	X	
Mathew Field	Private	X						X	X	
Melby	Private	X		X						
Rick's Field	Private		X							
South Hector Airstrip	Private	X							X	
Velo Airstrip	Private	X								
Wetenkamp	Private		X							
Whiskey Lake	Private	X			X	X				
Lesmeister Flying Service	Private	X						X		

Public Use Airports

There are several public use airports in the project area.

The Applicant Preferred Route is located in an instrument approach area of the Fergus Falls Municipal Airport; therefore, filing an FAA construction notice is required.

Construction occurring in the Applicant Preferred Route, Route A, or Option 3 will exceed the FAA Construction Notice Criteria for Chandler Field; therefore, filing with the FAA prior to construction is required.

Construction occurring in Route A will exceed the FAA Construction notice criteria at Elbow lake Municipal Airport; therefore, filing with the FAA prior to construction is required.

The closest VOR to the Applicant Preferred Route is located at the Fergus Falls Municipal Airport. The VOR is approximately 7,490 feet from the Applicant Preferred Route. In order to

comply with FAA regulations regarding VORs, the transmission line structures in this area could not be taller than 156 feet. The VOR is approximately 8,500 feet from the Applicant Preferred Route alignment. In order to comply with FAA regulations regarding VORs, the transmission line structures in this area could not be taller than 178 feet. These estimates assume that the ground surface elevation at the VOR site and the transmission line structures are the same.

Route A, Options 1, 2a, 2b, 3, AS-1, and AS-2 are not expected to impact any VORs.

5.4.3 Mitigation Measures

Roadways

Before construction begins, some potential impacts can be mitigated via coordination with the appropriate agencies and organizations regarding the placement of structures and construction methods. Final structure locations, ROW, and any disturbed areas could be determined by considering input from responsible transportation agencies (e.g. Mn/DOT, counties, townships) to minimize visual or construction impacts. Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design. The construction contractor could coordinate construction activities with the appropriate road agencies to avoid interference with their roadway construction and maintenance activities. The construction contractor should also work with the appropriate agencies to minimize impacts on roadway clear zones and rest areas.

Consideration of planned future transportation improvements could be made to select specific alignments that may be less likely to require future relocation. Where practical, crossings of roadway rights of way may be perpendicular to minimize the occupancy of roadway right of way airspace.

Construction of the project may require the use of private field roads or trails. The use of these access paths, plus the construction or use of any temporary access roads, staging or lay-down areas outside of the transmission ROW could require permission from the landowners through rental agreements. These areas should be restored to their preconstruction condition as much is feasibly possible, and may include regrading areas and restoring vegetation.

During construction, temporary guard structures may be used to string conductors over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Additional shielding of the transmission lines and equipment may be required in areas where roadway and ROW maintenance activities are expected to occur in close proximity with the transmission lines on a regular basis.

The additional construction and maintenance traffic on the surrounding roadway system is not expected to have a significant impact on traffic operations, and therefore, no mitigation is required.

Airports

With the proper safeguards and protective measures described above, impacts related to public health and safety are not anticipated. In addition, the proposed structures will comply with all

FAA airport and VOR height restrictions. Therefore, no additional mitigative measures are proposed.

5.5 WIRELESS TECHNOLOGIES

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted (corona consists of the breakdown or ionization of air within a few centimeters of conductors and hardware). This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

5.5.1 Affected Environment

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

FM radio receivers usually do not pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz), and
- The excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and 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.

Digital reception is in most cases more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they would impact digital television reception.

5.5.2 Potential Impacts

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose or damaged hardware may also cause television interference. The transmission line hardware would be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If interference occurs, Applicants could work with the microwave tower owner to mitigate the impacts.

If interference from transmission line corona does occur for an AM radio station that is within the station's primary coverage area and that had good reception before the Project was built,

satisfactory reception can be obtained by appropriate modification of the receiving antenna system. No widespread interference to television or radio reception is anticipated as a result of the project.

There are four communication towers within the Applicant Preferred Route, one within Route A, and one within Route Option 2b. There are no communication towers within the Applicant Preferred Route or the AS-3. Potential radio, television, cellular phone and GPS interference impacts are expected to be similar for the Applicant Preferred Route, Route A and Route Option 2b.

5.5.3 Mitigation

The transmission line hardware will be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If interference occurs,

Applicants will work with the microwave tower owner to mitigate the impacts.

If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations can be restored by appropriate modification of (or addition to) the receiving antenna system. In addition, if isolated radio or television interference occurs because of the transmission line, the Applicant could work with the affected landowner to restore reception to pre-project quality.

If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, Applicants could inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary.

In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants could work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

Digital reception is, in most cases, more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they will impact digital television reception. In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants will work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

5.6 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Archaeological and historic architecture resources are those places that represent the visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and importance, among other considerations; some are buried, while others are clearly evident on the landscape. The resources include pre-contact (Native American)

archaeological sites, historic-period (Euroamerican) archaeological sites, and 19th and 20th century buildings, bridges, railroads, and industrial sites.

5.6.1 Affected Environment

Definitions of terms clarify the meaning of locations as they relate to the project. The "project" refers to any action taken to construct or operate the transmission line. The "project route" refers to any of the potential routes being discussed at this time and the impact area of the transmission line whether from construction or operation. An "archaeological resource" refers to any surface or buried resource showing past human activity. A "historic architecture resource" refers to any standing post contact building or structure. The "Applicant" refers to Xcel Energy and Great River Energy.

In May of 2009 the Applicant reviewed records in the Minnesota State Historic Preservation Office (SHPO) archaeological and historic architecture resource database. Records were reviewed to document previously identified resources within the project vicinity.

Regardless of the transmission line route selected, the Applicant should conduct a Phase I inventory of resources in the selected route. Project documentation should follow the guidelines set up in the "SHPO Manual for Archaeological Projects in Minnesota" and the "Guidelines for History/Architecture Projects in Minnesota." Documentation prepared in this manner will allow the permitting agency to adequately review and consider the impact of this project upon the resources identified within the project route.

The information generated for this section was compiled using the text from sections 7.1.3, 7.2.3, and 8.7.4 of the "Application to the Minnesota Public Utilities Commission Office of Energy Security for a Route Permit for the Fargo to St. Cloud 345 kV Transmission Line Project, Docket # ET2, E002/TL-09-1056." The Applicant states previous cultural resource inventory report data is available. The inventory of the selected route includes a detailed discussion of previous cultural resources studies in the vicinity.

5.6.2 Potential Impacts

The North Dakota border to Alexandria section of the Applicant Preferred Route contains nine archaeological resources and 11 historic architecture resources. The archaeological resources may be represented by prehistoric isolated finds, prehistoric artifact scatters related to prehistoric time periods, historically documented prehistoric mounds, a historically documented ghost town, and/or historically documented Red River Trail used for commerce and transportation in the early nineteenth century. None of the archaeological resources in the Applicant Preferred Route have undergone evaluation for inclusion in the National Register of Historic Places (NRHP). Project plans and engineering efforts will strive to physically avoid all of these resources.

The Applicant Preferred Route intersects a scenic byway known as the King of Trails (U.S. Highway 75) just south of Moorhead. The discussion of scenic byways affected by the routes is included in Section 5.3 Recreation and Aesthetic Resources.

Route A contains a total of seven previously recorded cultural resources. Four of the resources are archaeological and may be represented by isolated finds or lithic artifact scatters dating to unspecified prehistoric periods. None of the archaeological resources in Route A have undergone evaluation for inclusion in the NRHP.

This North Dakota border to Alexandria section of Route A contains three historic architecture resources which include a school (also mentioned in the Applicant Preferred Route section), bridges, and/or the Lake Travers & Bois de Sioux Flood Control and Water project. The Lake Traverse & Bios de Sioux Flood Control and Water Project is considered eligible for listing on the NRHP.

Route A intersects a scenic byway known as the King of Trails (U.S. Highway 75) just south of Moorhead. The byway extends the entire length of Minnesota, paralleling the Red and Bois de Sioux Rivers in the western part of the state. The discussion of scenic byways affected by the routes is included in Section 5.3 Recreation and Aesthetic Resources.

Three of the route options; Option 1 and Option 2a, and Option 2b; do not contain any previously recorded cultural resources. Option 3 contains a total of four previously recorded cultural resources. The resources are documented as lithic or artifact scatters containing diagnostic material from the Woodland or unspecified prehistoric time periods. One of the four recorded archaeological resources is a Woodland period artifact scatter listed on the NRHP.

Option 2c was developed after submittal of this permit application. Hence, no discussion of cultural resources has occurred for this option.

5.6.3 Mitigation

Impacts to archaeological resources occur from ground disturbing activity during construction or operation of the project. These impacts can harm the information potential of the resource. A total of 17 archaeological resources have been identified within the Applicant Preferred Route, Route A, and Option 3. Impacts to the majority of these resources can be avoided by clear designation of the resource area, adjustments to the construction footprint, and designation of no construction and operation buffers around the resources. However, please note certain archaeological resources may be sensitive to visual intrusion. If such archaeological resources are identified within the project route (possibly, the one Woodland period site list on the NRHP located in Option 3) the Applicant should coordinate with SHPO as the sensitivity of this resource as it relates to the project action. Archaeological resource inventories should be completed in areas proposed for ground disturbance to identify undocumented archaeological resources. If archaeological resource cannot be avoided, resource evaluation leading to specific treatment would be developed by the Applicant in coordination with SHPO, Office of the State Archaeologist (OSA), and the Minnesota Department of Commerce (DOC) Office of Energy Security (OES) to mitigate the adverse impact caused by this project.

Impacts to historic architecture resources can result from physical damage to the structure or from construction/operation of the project. Indirect impacts can result from visual intrusions of project elements on the historic character or historic setting of the historic architecture resource. A total of 14 historic architecture resources have been identified within the Applicant Preferred

Route, Route A, and Option 3. Direct impacts to these resources can be avoided by identifying no construction and/or operation buffers, adjustment to project design so as to not impact the historic architecture resources physical makeup, and understand construction techniques so as to not harm historic architecture resource foundations. In addition, indirect impacts to a historic architecture should be considered and treatment techniques should be developed in coordination with SHPO, OES, and possibly OSA. A discussion maybe needed with the regulating agencies concerning indirect impacts for any of the historic architecture resources that are listed or eligible for listing on the NRHP. If any historic architecture resource cannot be avoided, resource evaluation leading to specific treatment would be developed by the Applicant in coordination with SHPO, OSA, and the OES to mitigate the adverse impact caused by this project.

The Applicant does not anticipate physical impacts to previously identified archaeological or historic architecture resources within the Applicant Preferred Route, Route A, Route E, and Option 3 as a result of project construction and/or operation. Avoidance will be used as a first step to mitigate impacts to archaeological and historic architecture resources. In the event that an impact occurs, coordination with SHPO, OSA, and OES would be needed and if applicable, further evaluation of the impacted resource to understand its eligibility for listing in the NRHP.

Upon selection of the final route the Applicant should sponsor a Phase Ia Literature Search of the review area (the review area is defined to be the project area plus one mile buffer around the project boundary). This information, possibly combined with other supplementary information, will identify the types of additional archaeological or historic architecture resources that could be located within the selected route. The Applicant can then use this information to develop a survey methodology appropriate for locating such resources. SHPO and OSA should be engaged to elicit any specific knowledge they have concerning the selected route.

The Applicant should then sponsor a Phase I Reconnaissance Survey within the selected route to identify additional undocumented archaeological and historic architecture resources. Once these resources are identified and project effects to these resources are understood communication should occur between the Applicant, SHPO, OSA, and OES. The communication between the parties should center on the resources that will be impacted by the project action.

Once an evaluation strategy for the impacted resources is complete, the Applicant should sponsor a Phase II Intensive Survey at these identified locations, if needed. Those resources deemed significant and eligible for listing or listed on the NRHP will require treatment. These treatment plans should be developed by the Applicant in coordination with SHPO, OSA, OES, and any other identified applicable party.

If needed, the Applicant should sponsor a Phase III Treatment activity for identified resources that are eligible for listing or listed on the NRHP that will receive impact. The result of the Phase III Treatment activity will provide documentation that the treatment plan(s) were carried out and completed in full.

5.7 LAND-BASED ECONOMIES

The primary land based economy in the area of the project is agriculture. Agricultural impacts are an important issue with respect to economics, soil, and land use. This section discusses the potential project impacts on agriculture, as well as forestry, tourism, and mining.

5.7.1 Affected Environment

Agriculture

According to the U.S. Department of Agriculture 2007 Census of Agriculture (USDA, 2009) primary crops in the project area are corn, soybeans, oats, wheat, sugar beets, and hay. Primary livestock found within the project area include dairy cattle, beef cattle, sheep, swine, and poultry. Table 5.7-1 illustrates the number of farms, average farm size, acres of farmland, market value of agricultural products, and market value of agricultural products per acre of farmland for each county within the project area between North Dakota and Alexandria.

Table 5.7-1. Agricultural Production within Project Area by County

County	Number of Farms	Average Farm Size (acres)	Acres of Farmland	Market Value of Agricultural Products (millions of dollars)	Market Value of Agricultural Products per Acre of Farmland (dollars)
Clay	921	666	613,819	$202	$329
Douglas	1,199	219	262,695	$65	$247
Grant	675	476	321,501	$103	$320
Otter Tail	3,296	273	898,703	$300	$334
Pope	1,055	341	360,095	$117	$325
Stevens	639	533	340,347	$244	$717
Traverse	479	684	327,627	$111	$339
Wilkin	428	993	424,976	$131	$308

The majority of lands within the proposed routes between North Dakota and Alexandria are zoned for agriculture. Refer to Table 5.7-2 below for the percentage of land zoned for agriculture in each route, route option, and post scoping option.

Table 5.7-2. Percent of Land Zoned Agricultural (Route)

Route/Option	Percent of Route Zoned Agriculture	Percent of Route Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred Route	49	-
Route A	73	0.06
Route Options		
Option 1		
Applicant Preferred Route	96	-
Option 1	100	-
Option 2		
Applicant Preferred Route	70	-
Option 2a	95	
Option 2b	78	-
Option 3		
Applicant Preferred Route	0	-
Option 3	0	-
Amended Scope Options		
Option AS-1	100	-
Applicant Preferred Route	100	-
Option AS-2	100	-
Option AS-3	0	-

Source: NCLD, 2001.

Forty-nine percent of lands occurring within the Applicant Preferred Route are zoned for agriculture between North Dakota and Alexandria. An additional 36 percent of lands occurring within the Applicant Preferred Route are not zoned or undefined. Being that the majority of the area outside of municipalities is agricultural, it is likely that a large portion of the 36 percent is also agricultural land. Seventy-three percent of lands occurring within Route A are zoned for agriculture, including 0.06 percent of those as special protection agriculture between North Dakota and Alexandria.

One hundred percent of the lands within Route Option 1 are zoned for agriculture whereas 96 percent of the lands within the Preferred Route ROW Occupancy and No ROW Occupancy alignments are zoned for agriculture. Route Option 2a has 95 percent lands within its route zoned for agriculture and Option 2b includes 78 percent agriculture whereas the Preferred Route ROW Occupancy Route has only 70 percent zoned for agriculture and the No ROW Occupancy Route includes no agricultural lands. No lands zoned for agriculture occur within Route Option 3 or the Preferred Route alternates. Finally, nearly 100 percent of the lands in AS-1, AS-2 and the Applicant Preferred Route alternates are zoned agriculture while AS-3 has no lands zoned for agriculture within its route.

During public outreach meetings for the Project, some landowners expressed concerns with whether high voltage transmission lines could interfere with electromagnetically guided cornering systems that some center pivot irrigation systems utilize. A study published in the Institute of Electronics and Electrical Engineers Transactions on Power Delivery (Olsen and Heins, 1998) found that the level and frequency of magnetic fields required to cause interference with the electromagnetically guided cornering systems is significantly higher than found near most high voltage transmission lines. Refer to Table 5.7-3 below for the number of center pivot irrigation systems found in each route, route option, and post scoping option.

Table 5.7-3. Center Pivot Irrigation Systems by Route and Route Option

Route/Option	Number of Center Pivot Irrigation Systems in Route)
Route Alternatives	
Applicant Preferred Route	0
Route A	1
Route Options	
Option 1	
Applicant Preferred Route	0
Option 1	0
Option 2	
Applicant Preferred Route	0
Option 2a	0
Option 2b	0
Option 3	
Applicant Preferred Route	0
Option 3	0
Amended Scope Options	
Option AS-1	0
Applicant Preferred Route	0
Option AS-2	0
Option AS-3	0

Only Route A includes a center pivot irrigation system.

Prime Farmland

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides soil surveys with detailed soil geographic data developed by the National Cooperative Soil Survey. The purpose of the data is to provide consistent soil mapping data and provides an inventory of important farmlands. Agricultural land designated as 'prime farmland,' indicates land that is most desirable for agricultural production. According to Federal regulation prime farmland is defined as, "land that has the best combination of physical and chemical

characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses" (7 CFR, 657.5 (a) (1)). Further land that is designated as 'farmland of statewide importance' is, "land; in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods" (7 CFR, 657.5 (c). Refer to Table 5.7-4 for an estimate of prime farmland located within the proposed project routes.

Table 5.7-4. Acreage of Prime Farmland within Route and Route Options

Route/Option	Prime Farmland in Route (Acres)
Route Alternatives	
Applicant Preferred Route	5,002
Route A	5,271
Route Option s	
Option 1	
Applicant Preferred Route	217
Option 1	168
Option 2	
Applicant Preferred Route	580
Option 2a	376
Option 2b	598
Option 3	
Applicant Preferred Route	108
Option 3	152
Amended Scope Options	
Option AS-1	2,256
Applicant Preferred Route	287
Option AS-2	894
Option AS-3	1

Forestry

The proposed routes and options are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within Minnesota Department of Natural Resources (MnDNR)-managed lands. The wooded areas are located primarily on privately held lands. The wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state. Refer to Table 5.7-5 below for the acreage of lands crossed by all of the proposed routes and options.

Table 5.7-5. Wooded Lands by Route (

Route/Option	Wooded lands in Route (Acres)
Route Alternatives	
Applicant Preferred Route	652
Route A	282
Route Options	
Option 1	
Applicant Preferred Route	49
Option 1	9
Option 2	
Applicant Preferred Route	49
Option 2a	48
Option 2b	57
Option 3	
Applicant Preferred Route	36
Option 3	64
Amended Scope Options	
Option AS-1	155
Applicant Preferred Route	50
Option AS-2	114
Option AS-3	0

Source: NCLD, 2001.

Tourism

The majority of tourism activities or opportunities along the proposed routes and Route Options are associated with recreational uses. Refer to Section 5.3 for a discussion of recreational uses along the proposed routes between North Dakota and Alexandria.

Mining

In 1984, Minnesota Statues Section 84.94 was passed, which required each county in Minnesota to identify and protect aggregate resources. Since then, counties in Minnesota have begun to identify areas of potential mining and develop long-term comprehensive plans that incorporate aggregate resources (MnDNR, 2009a). Clay County is one of only two counties of which mapping of Aggregate Resources have been completed by the MnDNR. Due to the incompleteness of the mapping across the project area, aggregate resources in the project area were identified using the Mn/DOT Aggregate Source Information System, which is a database of aggregate sources that are depicted on County Pit Maps. County Pit Maps show the locations of gravel pits, rock quarries, and commercial aggregate sources. The maps were completed prior to 2003 and there are no plans to update the maps.

Based on the Aggregate Source Information System database, four aggregate sources are identified within Applicant Preferred Route between North Dakota and Alexandria. One of the sources is an aggregate pit that has never been drilled and sampled near Brandon in Douglas

County. Two of the sources are prospected aggregate pits that are prospected and/or leased by Mn/DOT near Dalton in Otter Tail County. One of the sources is an inactive aggregate source near Barnesville in Clay County that is either depleted or unavailable for future use. No aggregate sources have been identified in Route A, the Route Options, or the Amended Scope Options between North Dakota and Alexandria.

Table 5.7-6. Aggregate Sources

Route	Total Number of Aggregate Sources in Route	Aggregate Source Status			
		Source Status Prospected Pit	Inactive Aggregate Source	Commercial Aggregate Source	Mn/DOT owned or managed Aggregate Source
Route Alternatives					
Applicant Preferred Route	4	2	2	-	1
Route A	0	-	-	-	-
Route Options					
Option 1					
Applicant Preferred Route	0	-	-	-	-
Option 1	0	-	-	-	-
Option 2					
Applicant Preferred Route	0	-	-	-	-
Option 2a	0	-	-	-	-
Option 2b	0	-	-	-	-
Option 3					
Applicant Preferred Route	0	-	-	-	-
Option 3	0	-	-	-	-
Amended Scope Options					
Option AS-1	0	-	-	-	-
Applicant Preferred Route	0	-	-	-	-
Option AS-2	0	-	-	-	-
Option AS-3	0	-	-	-	-

5.7.2 Potential Impacts

Agriculture

The majority of the lands in the area between North Dakota and Alexandria are agricultural. Refer to Table 5.7-2 below for percentage of lands zoned for agriculture and Table 5.7-3 for the number of center pivot irrigation systems within each ROW for the proposed route, route options, and post scoping options followed by a discussion of these impacts.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. Impacts associated with the proposed routes and options assume 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil

compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other work areas. Temporary impacts are estimated at a rate of one acre per pole. In order to calculate impacts to agriculture vegetation the National Land Cover Data was applied. Agricultural lands include pasture/hay land, row crops and small grains. Vegetation is comprised of wooded and non-wooded lands that are not agriculture. Refer to Table 5.7-4 below for estimated temporary and permanent impacts to vegetation between North Dakota and Alexandria.

Table 5.7-7. Percent of Land Zoned Agricultural (ROW)

Route/Option	Percent of ROW Zoned Agriculture	Percent of ROW Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred ROW Occupancy	56	-
Applicant Preferred No ROW Occupancy	56	-
Route A	75	0.05
Route Options		
Option 1		
Applicant Preferred ROW Occupancy	100	-
Applicant Preferred No ROW Occupancy	100	-
Option 1	100	-
Option 2		
Applicant Preferred ROW Occupancy	69	
Applicant Preferred No ROW Occupancy	69	-
Option 2a	94	
Option 2b	79	-
Option 3		
Applicant Preferred ROW Occupancy	0	-
Applicant Preferred No ROW Occupancy	0	-
Option 3	0	-
Amended Scope Options		
Option AS-1	100	-
Applicant Preferred ROW Occupancy	100	-
Applicant Preferred No ROW Occupancy	100	-
Option AS-2 ROW Occupancy	100	-
Option AS-2 No ROW Occupancy	100	-
Option AS-3	0	-

Table 5.7-8. Center Pivot Irrigation Systems by ROW

Route/Option	Number of Center Pivot Irrigation Systems in ROW)
Route Alternatives	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Route A	1
Route Options	
Option 1	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 1	0
Option 2	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 2a	0
Option 2b	0
Option 3	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 3	0
Amended Scope Options	
Option AS-1	0
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option AS-2 ROW Occupancy	0
Option AS-2 No ROW Occupancy	0
Option AS-3	0

Table 5.7-9. Temporary and Permanent Impacts to Agricultural Lands

Route/Option	Estimated Number of Poles	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (1,000 SF Per Pole) SF	Permanent Impacts (1,000 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	604	604	33,241	0.77
Applicant Preferred No ROW Occupancy	613	613	33,698	0.78
Route A	515	515	28,319	0.65
Route Options				
Route Option 1				
Applicant Preferred ROW Occupancy	19	19	1,072	0.03
Applicant Preferred No ROW Occupancy	19	19	1,058	0.03
Option 1	24	24	1,321	0.03
Route Option 2				
Applicant Preferred ROW Occupancy	45	45	2,449	0.05
Applicant Preferred No ROW Occupancy	46	46	2,538	0.06
Option 2a	53	53	2,915	0.07
Option 2b	47	47	2,581	0.06
Route Option 3				
Applicant Preferred ROW Occupancy	12	12	655	0.01
Applicant Preferred No ROW Occupancy	11	11	602	0.01
Option 3	20	20	1,094	0.03
Amended Scope Options				
Option AS-1	108	108	5,954	0.13
Applicant Preferred ROW Occupancy	109	109	5,995	0.14
Applicant Preferred No ROW Occupancy	114	114	6,294	0.15
Option AS-2 ROW Occupancy	127	127	6,994	0.16
Option AS-2 No ROW Occupancy	133	133	7,296	0.17
Option AS-3	0	0	0	0

Source: NCLD, 2001.

Applicant Preferred Route

Fifty-six percent of the lands occurring within the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments are zoned for agriculture. An additional 31 percent of the lands in the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments are not zoned or undefined. Being that the majority of the area outside of municipalities is agricultural, it is likely that a large portion of the 31 percent is also agricultural land. There are no center pivot irrigation systems in the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. The permanent impacts associated with the Applicant Preferred ROW Occupancy

and No ROW Occupancy ROWs between North Dakota and Alexandria represents approximately 0.77 acres and 0.78 acres of impacts repsectively, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other work areas. Temporary impacts are estimated at approximately 604 and 613 acres, based on a rate of one acre per pole, for the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments.

Route A

Seventy-five percent of the lands within the assumed Route A ROW are zoned for agriculture including 0.05 percent of those as special protection agriculture. One center pivot irrigation system is located within the assumed Route A ROW between North Dakota and Alexandria.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. These permanent impacts associated with Route A between North Dakota and Alexandria represents approximately 0.65acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 515 acres, based on a rate of one acre per pole.

While a greater percentage of land within the Route A ROW is agricultural, the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments have greater permanent and temporary impacts because they are longer than Route A and have a greater number of poles.

Option 1

One hundred percent of Option 1 and the Applicant Preferred Route Options at this location are zoned for agriculture. There are no center pivot irrigation systems at this location. The permanent impacts are generally the same for both Option 1 and the Applicant Preferred ROW Occupancy and No Occupancy alignments. Option 1 would temporarily impact an additional five acres of agricultural lands.

Option 2

Ninety-four percent of Option 2a and seventy-nine percent of Option 2b are zoned for agriculture, whereas the Applicant Preferred ROW Occupancy and No Occupancy ROWs hold only sixty-nine percent of lands as zoned for agriculture. There are no center pivot irrigation systems at this location. Permanent impacts are similar between the options with Option 2a having impacting a tenth of an acre more agricultural land than the other options. Option 2a and 2b temporarily impact more acres of agricultural land than the Applicant Preferred ROW Occupancy and No Occupancy ROWs.

Option 3

None of the lands in Option 3 or the Applicant Preferred ROW Occupancy and No Occupancy ROWs are zoned for agriculture at this location. There are no center pivot irrigation systems at this location. Option 3 has slightly greater permanent impacts on agricultural lands and more temporary impacts than the Applicant Preferred ROW Occupancy and No Occupancy alignments.

Amended Scoping Options

One hundred percent of AS-1 and AS-2 are zoned for agriculture as are their alternates. No land in AS-3 is zoned for agriculture. There are no center pivot irrigation systems in any of the Amended Scoping options or their alternates. Permanent impacts from AS-1 represent the lowest impact to agricultural lands. AS-2 has slightly higher impacts than the Applicant Preferred ROW Occupancy and No Occupancy alignment. The AS-2 No ROW Occupancy alignment has the greatest impact on agricultural lands and AS-1 has the fewest temporary impacts on agricultural lands.

Prime Farmland

Prime farmland resources are an important contribution to the land based economics of the counties between North Dakota and Alexandria. Refer to Table 5.7-10 for the acreage of prime farmland within the Proposed Route and route option ROWs.

Table 5.7-10. Acreage of Prime Farmland within Proposed ROW

Route/Option	Prime Farmland in ROW (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	636
Applicant Preferred No ROW Occupancy	635
Route A	820
Options	
Option 1	
Applicant Preferred ROW Occupancy	28
Applicant Preferred No ROW Occupancy	27
Option 1	27
Option 2	
Applicant Preferred ROW Occupancy	66
Applicant Preferred No ROW Occupancy	59
Option 2a	61
Option 2b	63
Option 3	
Applicant Preferred ROW Occupancy	12
Applicant Preferred No ROW Occupancy	12
Option 3	28
Amended Scope Options	
Option AS-1	63
Applicant Preferred ROW Occupancy	40
Applicant Preferred No ROW Occupancy	42
Option AS-2 ROW Occupancy	74
Option AS-2 No ROW Occupancy	76
Option AS-3	0

Agricultural land designated as "prime farmland," indicates land that is most desirable for agricultural production based on soils data. The Route A ROW includes more prime farmland than the Applicant Preferred Route ROWs which is expected as it traverses areas that are predominantly agricultural whereas the Applicant Preferred Routes follow the Interstate 94 corridor. Option 1 does not impact more prime farmland than the Applicant Preferred Route No ROW Occupancy option and impacts less prime farmland than the ROW Occupancy option.

Options 2a and 2b impacts more prime farmland than the Applicant Preferred No ROW Occupancy alignment and less prime farmland than the ROW Occupancy alignment. Option 3 impacts a significant more amount of prime farmland than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments. Finally, The Amended Scope options would have greater impacts on prime farmland than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments.

Forestry

The proposed routes are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within MnDNR managed lands. Forest resources, notably tree stands, are present along the proposed routes. Refer to Table 5.7-11 for the acreage of wooded lands within each ROW for route options between North Dakota and Alexandria.

Table 5.7-11. Impacts to Wooded Lands

Route/Option	Wooded Lands in ROW (Acres))
Route Alternatives	
Applicant Preferred ROW Occupancy	48
Applicant Preferred No ROW Occupancy	51
Route A	37
Route Options	
Option 1	
Applicant Preferred ROW Occupancy	1
Applicant Preferred No ROW Occupancy	0
Option 1	2
Option 2	
Applicant Preferred ROW Occupancy	4
Applicant Preferred No ROW Occupancy	4
Option 2a	8
Option 2b	8
Option 3	
Applicant Preferred ROW Occupancy	5
Applicant Preferred No ROW Occupancy	6
Option 3	5
Amended ScopeOptions	
Option AS-1	1
Applicant Preferred ROW Occupancy	8
Applicant Preferred No ROW Occupancy	9
Option AS-2 ROW Occupancy	3
Option AS-2 No ROW Occupancy	4
Option AS-3	0

Source: NCLD, 2001.

The Applicant Preferred ROW Occupancy and No ROW Occupancy have greater impacts on wooded lands than Route A.

Route Option 1 impacts more wooded lands than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments. Route Option 2a and 2b impact twice as many acres as the than the Applicant Preferred Route ROW Occupancy and No Occupancy alignments. Finally, Option 3 impacts approximately the same amount of wooded lands as the Applicant Preferred Route ROW Occupancy and No Occupancy alignments. The Amended Scope Options impact

fewer wooded lands than the Applicant Preferred Route ROW Occupancy and No Occupancy alignments.

The wooded areas are located primarily on privately held lands. Wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state. According to the MnDNR, Forestry Division, Fiscal Year 2010 Harvest Plans (MnDNR, 2009b), no townships within the proposed routes or route options have timber harvest plans. Impacts on forest resources will occur at locations where trees will be cleared within the right-of-way.

Tourism

No impacts to tourism are anticipated. The majority of tourism activities or opportunities along the Applicant Preferred Route, Route A and Route Options between North Dakota and Alexandria are associated with recreational uses. Refer to section 5.3 for a discussion of recreational uses along the proposed routes. No impacts are anticipated and therefore no mitigative measures are proposed.

Mining

Based on the Aggregate Source Information System database, there are no aggregate sources identified within the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments between North Dakota and Alexandria. No aggregate sources have been identified within the ROW for Route A, the Route Options, or the Amended Scope Options between North Dakota and Alexandria.

5.7.3 Mitigation

Agriculture and Prime Farmland

Together with the Department of Agriculture and other parties, Applicants have developed an Agricultural Impact Mitigation Plan (AIMP) to identify measures the utilities could take to avoid, mitigate, repair, and/or provide compensation for impacts that may result from construction of the proposed transmission facilities. A copy of the final AIMP is included in Appendix G.

Landowners could be compensated for the use of their land through easement payments. To minimize loss of farmland and to ensure reasonable access to the land near the poles, Applicants prefer to place the poles approximately five feet from the road right-of-way. When possible, Applicants intend on attempting to construct the transmission line before crops are planted or following harvest. Applicants intend on compensating landowners for crop damage and soil compaction that occurs as a result of the project. Soil compaction could be addressed by compensating the farmer to repair the ground or by using contractors to chisel-plow the site. Normally, a declining scale of payments is set up over a period of a few years.

To further minimize agricultural impacts where possible, spring time construction may be avoided. However, if construction during spring is necessary, disturbance to farm soil from access to each structure location could be minimized by using the shortest access route feasible or practicable. This may require construction of temporary driveways between the roadway and

the structure but could limit traffic on fields between structures. Construction mats may also be used to minimize impacts on the access paths and in construction areas.

Some landowners use GPS navigation systems on farm equipment. Once the project is complete, the transmission line poles could have GPS coordinates that Applicants may provide to the landowners, if requested.

Tile lines may be present along the transmission line route. Applicants intend on working with the landowners to identify locations of drainage tiles along the route and intend on minimizing interference with tiling, where possible. In the event that Applicants locate a tile line that the landowner did not discuss, Applicants could relocate the pole and repair the tile line, if damaged.

Crop dusting may occur within agricultural fields along the route. If this farming practice is utilized, and has the potential to become impacted by the project, Applicants intend on working with the landowner to identify mitigative measures to avoid or reduce changes to farming practices caused by the project.

Forestry

Impacts on wooded lands have been minimized by locating the proposed routes to minimize tree clearing to the extent feasible. As a result, no mitigative measures are proposed.

Mining

The Applicant Preferred Route, Route A, and Route Options are not located within immediate proximity of any mines, nor would it otherwise have any affect on existing mining operations. Therefore, no mitigative measures are proposed.

5.8 WATER RESOURCES

This section discusses the Water Resources in the project area between Fargo, North Dakota and Alexandria, Minnesota and the potential impacts on these resources. Water Resources evaluated in this section include Surface Water, Ground Water, Wetlands, and Floodplains.

5.8.1 Affected Environment

The proposed project routes cross two major water resource regions (watersheds), as defined by the United States Geological Survey (USGS). The proposed routes cross both the Souris-Red-Rainy Region (09) and the Upper Mississippi Region (07). Within these regions the Applicant Preferred Route crosses 6 smaller watersheds and Route A crosses 5 smaller watersheds. These watersheds are denoted by 8-digit Hydrologic Unit Codes (HUC 8). Tables 5.8-1 and 5.8-2 contain a list of all the HUC 8 watersheds crossed by the Applicant Preferred Route and Route A.

Table 5.8-1. Watersheds (HUC 8) Crossed by the Applicant Preferred Route and Options

Watershed Name	Hydrologic Unit Code
Long Prairie River	07010108
Pomme de Terre River	07020002
Chippewa River	07020005
Otter Tail River	09020103
Upper Red River of the North	09020104
Buffalo River	09020106

Table 5.8-2. Watersheds (HUC 8) Crossed by Route A

Watershed Name	Hydrologic Unit Code
Long Prairie River	07010108
Pomme de Terre River	07020002
Chippewa River	07020005
Bois de Sioux	09020101
Mustinka River	09020102

Surface Water

The project occurs within northwestern Minnesota, an area covered with several surface water resources. Surface Water resources are defined as both lakes and surface flows (rivers and streams) within the project area. Some surface waters are designated as Public Waters by the State of Minnesota and are under the regulatory jurisdiction of the MnDNR and are listed in the Public Waters Inventory (PWI). The statutory definition of public waters can be found in Minn. Stat. 103G.005, subdivisions 15 and 15a.

Several streams, rivers, and lakes occur within the proposed routes. The Applicant Preferred Route and associated route options cross a total of 48 intermittent surface flows, 4 of which are PWI surface flows and 19 perennial surfaces flows, 17 of which are PWI surface flows. Named PWI surface flows crossed by the Applicant Preferred Route include; Buffalo River South Branch, Chippewa River, Long Prairie River, Otter Tail River, Pelican River, Pomme de Terre River, Red River of the North, Deerhorn Creek, and Stony Creek. The Preferred Route also contains several PWI water bodies; Burns, Clear, Cook, Hansel, Indian, Iverson, Lakota, Lobster, long, Mahla, Mina, Mud, and Rose.

Route A crosses a total of 66 intermittent surface flows, 7 of which are PWI surface flows, and 10 perennial surface flows 5 of which are PWI surface flows. Named PWI surface flows crossed by Route A include; Chippewa River, Mustinka River, Pomme de Terre River, Rabbit River, Red River of the North, Bois de Sioux River. The Preferred Route also contains several PWI water bodies; Andrew, Bolin, Horseshoe, Island, Long, Mud, and Turtle. Surface flows and water bodies contained in the proposed routes are shown on detailed maps in Appendix H.

Amended Scope Route 1 crosses a total of 12 intermittent surface flows, 2 of which are PWI surface flows, and 5 perennial surface flows all of which are PWI surface flows. Named PWI surface flows crossed by Amended Scope Route 1 include the Red River of the North, Buffalo River South Branch, and Stony Creek. Amended Scope Route 2 crosses a total of 10 intermittent surface flows, 1 of which is a PWI surface flow, and 6 perennial surface flows 5 of which are PWI surface flows. Named PWI surface flows crossed by Amended Scope Route 2 includes; Red River of the North, Buffalo River South Branch, and Deerhorn Creek.

Amended Scope Route 4 (Alexandria Sub-Station) contains no surface flows or PWI water bodies. Surface flows and water bodies contained in the proposed routes and route options are shown on detailed maps in Appendix H.

Section 303(d) of the federal CWA requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants; these are also referred to as impaired waters. The list, known as the 303(d) list, is based on violations of water quality standards. In Minnesota, the Minnesota Pollution Control Agency (MPCA) has jurisdiction over determining 303(d) waters. Several of the Surface Waters located within the proposed routes are on the 303(d) list. The Applicant Preferred Route crosses 7 impaired waters, 4 of which are surface flows and 3 of which are lakes. Route A crosses 5 impaired waters, all of which are surface flows. Table 5.8-3 contains a list of impaired waters contained within the proposed routes, along with the causes of impairment based on the 2008 MPCA 303(d) list.

Table 5.8-3. Impaired Water Crossed or within the Proposed Routes

Watercourse Name	Impairment
Applicant Preferred Route	
Pomme de Terre River	Mercury
Chippewa River	Turbidity
Red River of the North	Mercury, Polychlorinated Biphenyls, Turbidity
Stony Creek	Turbidity
Lakota Lake (North Bay)	Mercury
Lakota Lake (South Bay)	Mercury
Lobster Lake (East Bay)	Mercury
Route A	
Pomme de Terre River	Mercury
Chippewa River	Turbidity
Rabbit River	Fish Index of Biological Integrity, Turbidity, Dissolved Oxygen
Mustinka River	Turbidity
Bois de Sioux River	Fish Index of Biological Integrity, Turbidity, Dissolved Oxygen
Option 2b	
Chippewa River	Turbidity
Option 3	
Mary Lake	Mercury
Option AS-1	
Buffalo River, South Branch	Fish Index of Biological Integrity,
Option AS-2	
Stony Creek	Turbidity

Groundwater Resources

The state of Minnesota is divided into six groundwater provinces with varying characteristics. The majority of the Applicant Preferred Route and associated options, as well as Route A cross the Central Province, which is characterized by sand aquifers in generally thick sandy and clayey glacial drift overlying Precambrian and Cretaceous bedrock. Groundwater within fractured and weathered Precambrian bedrock is used locally as a water source. The extreme western portion of the Applicant Preferred Route, Options AS-1 and AS-2, and Route A cross the Western Province, which contains clayey glacial drift overlying Cretaceous and Precambrian bedrock (MnDNR, 2001).

A query of the county well index, a computerized database containing basic well information for over 340,000 water wells drilled in Minnesota, was preformed to identify water wells that may occur within the proposed routes and route option. Table 5.8-4 summarizes the water wells located within the proposed routes. Portions of both the Applicant Preferred Route and Route A cross a wellhead protection area (WHPA). The Applicant Preferred Route crosses the Barnesville WHPA near Barnesville, Minnesota. Route A crosses the Barrett WHPA near

Barrett, Minnesota. These areas are defined as areas having been established to protect public water supply wells from potential contamination sources. WHPAs are administered by the Minnesota Department of Health under the state wellhead protection rule (Minn. Rule 4720.5100-4720.5590).

Table 5.8-4. Water Wells contained within the Proposed Routes and Route Options

Route and Option	Water Wells
Applicant Preferred Route	53
Route A	44
Option 1	0
Option 2a	2
Option 2b	3
Option 3	12
AS-1	23
AS-2	12
AS-3	0

Wetlands

Wetlands are present at several points along the proposed routes. Wetlands perform many important hydrologic functions, such as maintaining stream flows, slowing and storing floodwaters, stabilizing stream banks, nutrient removal and uptake, and groundwater recharge. In the State of Minnesota, wetlands are regulated under the Wetland Conservation Act (WCA) and therefore require coordination with the Minnesota Board of Water and Soil Resources (BWSR) and Section 404 of the CWA by the USACE. PWI wetlands are also regulated by the MnDNR.

The USFWS National Wetlands Inventory (NWI) was used to identify wetlands throughout the proposed routes and route options. Starting in the 1970s, the USFWS produced maps of wetlands (NWIs) based on aerial photographs and Natural Resources Conservation Service (NRCS) soil survey maps. Because land use has changed since the 1970s, wetlands shown on the NWI maps are sometimes inconsistent with current wetland conditions; however, NWIs are the most accurate and readily available database of wetland resources within the proposed project area.

For jurisdictional purposes (to determine which agencies have authority over certain wetland types), the USACE and the State of Minnesota jointly define wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

A total of 962 acres of wetlands occur within the Applicant Preferred Route, 84 acres of which are PWI wetlands. 479 acres of wetlands occur within Route A, 24 acres of which are PWI

wetlands. 9 acres of wetlands occur within Route Option 1, 2 of which are PWI wetlands. 52 acres of wetlands occur within Route Option 2a, 17 of which are PWI wetlands. 101 acres of wetlands occur within Route Option 2b, 53 of which are PWI wetlands. 60 acres of wetlands occur within Route Option 3, 26 of which are PWI wetlands. Table 5.8-5 summarizes the total acreage of NWI wetlands by type that occur within the proposed routes.

Table 5.8-5. Wetland Type and Acreage within the Proposed Routes and Route Optionss

Wetland Type	Total Acreage within Route
Applicant Preferred	
Freshwater Emergent	588
Freshwater Forested/Shrub Wetland	40
Freshwater Pond	92
Lake	215
Riverine	26
Route A	
Freshwater Emergent	387
Freshwater Forested/Shrub Wetland	31
Freshwater Pond	21
Lake	35
Riverine	5
Option 1	
Freshwater Emergent	6
Freshwater Pond	3
Option 2a	
Freshwater Emergent	45
Freshwater Forested/Shrub Wetland	1
Freshwater Pond	1
Lake	5
Option 2b	
Freshwater Emergent	63
Freshwater Forested/Shrub Wetland	1
Freshwater Pond	12
Lake	25
Option 3	
Freshwater Emergent	46
Freshwater Forested/Shrub Wetland	6
Freshwater Pond	3
Lake	5
Option AS-1	
Freshwater Emergent	75
Freshwater Forested/Shrub Wetland	4

Wetland Type	Total Acreage within Route
Riverine	21
Option AS-2	
Freshwater Emergent	5
Freshwater Forested/Shrub Wetland	3
Freshwater Pond	7
Lake	11
Riverine	23
Option AS-3	
Freshwater Pond	3

Floodplains

Floodplains are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans and subject to geomorphic (land-shaping) and hydrologic (water flow) processes. Floodplains are regulated at both the state and federal levels to promote and ensure sound land use development in floodplain areas.

Federal Emergency Management Agency (FEMA) collected data and has mapped floodplains nationwide. FEMA defines a 100-year flood zone as the following: "A 100-year flood is the flood elevation that has a one percent chance of being equaled or exceeded each year. The 100-year flood is that standard used by most Federal and state agencies and is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and determination of flood insurance" (FEMA FAQ documents).

FEMA maps were reviewed to determine the presence of floodplains within the proposed routes. This search indicated that there are several floodplains areas located within the proposed routes. The Chippewa, Red, Buffalo South Branch, Pomme de Terre, and Rabbit Rivers along with Pelican Creek have floodplain zones which are classified as 100-year elevations within the proposed routes. The acreages of floodplains within the proposed routes are shown in Table 5.8-6.

Table 5.8-6. Floodplains within the Proposed Route and Route Options

Route	Floodplain	Acres
Route Alternatives		
Preferred Route	100-Year	232
Route A	100-Year	330
Route Options		
Option 1	100-Year	0
Option 2a	100-Year	7
Option 2b	100-Year	7
Option 3	100-Year	0
Amended Scope Options		
Applicant Preferred *	100-Year	220
Option AS-1	100-Year	1,344
Option AS-2	100-Year	635
Option AS-3	100-Year	0

**This segment is the comparable portion of the Applicant Preferred Route for AS-1&2*

5.8.2 Potential Impacts

This section presents the potential impacts the project could have on water. A 150-foot-wide ROW was used to calculate impacts for each proposed route. The Applicant is proposing to parallel the Interstate 94 corridor for significant segments of the Applicant Preferred Route. To address the potential for conflicts with occupancy of Interstate 94 right of way, the Applicant specifically identified two alignment options for these routes, the ROW Occupancy (alignment centerline generally 25 feet outside the edge of Interstate 94 right of way) and the No ROW Occupancy (alignment centerline generally 75 feet outside the edge of Interstate 94 right of way). The 150-foot-wide ROW was also used to calculate impacts for each of the three Applicant Preferred Route Options in this area. Although the specific alignments have not been determined, the tables included below provide a qualitative assessment of the type of impacts that could occur when a final alignment has been selected.

Surface Water

Because all rivers, streams, and ditches would be spanned by transmission structures or avoided (if possible), a limited number of structures would be located within these features and impacts on rivers, streams, or ditches would be minimized. Indirect impacts could include sedimentation reaching surface waters during construction due to ground disturbance by excavation, grading, construction traffic, and dewatering of holes drilled for transmission structures. This could temporarily degrade water quality due to turbidity. Several surface flows would be crossed by the proposed routes. These crossings are summarized in Tables 5.8-7 and 5.8-8.

Table 5.8-7. Potential Surface Water Impacts on Routes

Route	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Applicant Preferred ROW Occupancy	14	28	17
Applicant Preferred No ROW Occupancy	14	28	17
Route A	7	53	11

Table 5.8-8. Potential Surface Water Impacts on Route Options

Route/Options	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Option 1			
Applicant Preferred ROW Occupancy	0	0	0
Applicant Preferred No ROW Occupancy	0	0	0
Option 1	0	0	0
Option 2			
Applicant Preferred ROW Occupancy	2	2	2
Applicant Preferred No ROW Occupancy	2	2	2
Option 2a	4	3	2
Option 2b	2	0	2
Option 3			
Applicant Preferred ROW Occupancy Alignment	0	0	0
Applicant Preferred No ROW Occupancy Alignment	0	0	0
Option 3	0	0	0
Amended Scope Options			
Applicant Preferred ROW Occupancy	5	4	5
Applicant Preferred No ROW Occupancy*	5	4	5
Option AS-1	4	11	7
Option AS-2	6	9	4
Option AS-3	0	0	0

Surface waters are protected under section 401 of the CWA, which grants states authority to regulate discharges to surface waters. In Minnesota the MPCA is the authority over discharges to surface waters. All of the proposed routes and options would require a National Pollution

Discharge Elimination System Permit (NPDES) permit from the MPCA for the discharge of stormwater generated from construction activities.

The USACE maintains jurisdiction over waters of the U.S. The definition of "waters of the United States" is found in 40 Code of Federal Regulations 230.3(s). Under Section 404 of the CWA. It is anticipated that this project would be covered under the USACE 2007 Nation Wide Permit (NWP) 12 – Utility Line Activities. Conditions of NWP 12 would require preconstruction notification to the District Engineer 30 days prior to commencement of construction activities.

The Red River of the North is listed as a Navigable Water of the U.S. by the USACE. Under Section 10 of the River and Harbors Act of 1899, a USACE permit is required to do any work in, over, or under a Navigable Water of the U.S. Waterbodies have been designated as Navigable Waters of the U.S. based on their past, present, or potential use for transportation for interstate commerce. NWP 12 authorizes work under both Section 404 and Section 10. However, a letter of approval from the USACE may be required for work within Navigable Waters of the U.S.

Groundwater Resources

All well locations within the proposed routes and route alternatives would be avoided, therefore no impacts to groundwater resources are anticipated. Coordination with the both MDH and the local administrators of the WHPA located within each of the proposed routes would be required in order to comply with the regulations of the WHPA and avoid any impacts to groundwater resources.

Wetlands

Temporary and permanent wetland impacts that would occur due to construction and operation of the project were determined using the NWI and PWI to estimate the acres of wetland located within 150-foot-wide ROW.

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. Permanent impacts on wetlands would take place where structures must be located within wetland boundaries. Wetland impacts due to permanent structure placement would result in approximately 55 square feet of permanent impacts per standard single-pole structure. Temporary impacts would total approximately 20-foot-wide by length of the transmission line span of the wetland, which is the assumed width of a temporary access road. Table 5.8-9 below identifies the potential wetland impacts in the area of the proposed routes and options. Appendix H illustrates the wetland locations within the proposed routes and options.

Table 5.8-9. Potential Wetland Impacts on Routes and Route Options

Routes/Options	Wetlands[1] NWI							Wetlands PWI[4]		
	Total Wetlands Within the ROW (Acres)	Number of Wetlands the ROW Crosses	Forested Wetlands in ROW (Acres)	Number of Forested Wetlands ROW Crosses	Number of Poles in Wetlands[2]	Permanent Wetland Impacts (Acres.)[2]	Temporary Wetland Impacts (Acres)[3]	Number of PWI Lakes and Wetlands within ROW	Number of Poles in PWI Wetlands by Alignment	Permanent Wetland Impacts (Acres)[2]
Route Alternatives										
Applicant Preferred ROW Occupancy	40	144	6.2	12	2	.002	22.4	17	1	.001
Applicant Preferred No ROW Occupancy	43	158	6.7	12	5	.005	17.3	21	2	.002
Route A	28	139	5.7	12	5	.002	13.1	8	1	.001
Option 1										
Applicant Preferred ROW Occupancy	3	5	0	0	0	0	0.7	2	0	0
Applicant Preferred No ROW Occupancy	3	0	0	0	0	0	0.9	2	0	0
Option 1	1	1	0	0	0	0	0.3	0	0	0
Option 2										
Applicant Preferred ROW Occupancy	11	17	0	0	0	0	2.7	6	0	0
Applicant Preferred No ROW Occupancy	11	19	0	0	2	.002	1.7	8	0	0
Option 2a	4	15	0	0	0	0	0.9	1	0	0
Option 2b	13	23	0	0	2	.002	3.1	7	0	0
Option 3										
Applicant Preferred ROW Occupancy	6	6	1.1	2	0	0	1.7	2	0	0
Applicant Preferred No ROW Occupancy	6	6	1.2	2	2	.002	1.7	2	1	.001
Option 3	7	22	0.7	3	0	0	1.6	1	0	0
Amended Scope Options										
Applicant Preferred ROW Occupancy	4.8	10	2.3	4	0	0	1.3	0	0	0
Applicant Preferred No ROW Occupancy	6.0	10	2.3	4	2	.002	1.8	0	0	0
Option AS-1	6.2	9	0.8	2	0	0	1.7	0	0	0
Option AS-2 ROW Occupancy	4.9	9	0	0	0	0	1.3	0	0	0
Option AS-2 No ROW Occupancy	4.8	10	2.3	4	0	0	1.3	0	0	0
Option AS-3	0	0	0	0	0	0	3	0	0	0

[1] *Wetland numbers were calculated using the NWI maps. These values represent an estimate of the number of wetlands likely present along the route. These values do not necessarily represent the number of wetland impacts subject to state and federal delineation of wetlands.*

[2] *The number of poles was determined by preliminary pole spotting conducted by Applicants and the identification of wetlands was determined using NWI wetland data for the Applicant Preferred Route, the number of poles was calculated by taking the length of the wetland crossing and divided it by an 800 foot span. The final number of poles in wetlands is dependant on final design and engineering and field delineation of wetlands. Permanent Impacts were calculated using .001 acre per pole (55 square feet per pole).*

[3] *Temporary impacts were calculated by identifying the acreage of wetlands that are within 10 feet of each side of the alignment (20 feet total width). The 20 feet in width is the assumed width of a temporary access road. This estimate is worst-case based as the entire length of the wetland would not likely need to be traversed during construction*

[4] *Stream crossings were compiled using the MnDNR 24K streams dataset. Lakes were identified using the MnDNR 24K lakes dataset. PWI streams, waters, and wetlands were identified in the MnDNR datasets. PWI waters were identified using the MnDNR PWI dataset.*

As discussed previously, the USACE holds jurisdiction waters of the U.S. Impacts to wetland areas are regulated and would comply with the conditions of NWP 12. Additionally, a license to cross PWI wetlands is required from the MnDNR. Other permits potentially needed include a Section 401 CWA, Water Quality Certification. This project may not require a permit under WCA by definition (Minn. R. 8420.0110 Subpart 18) or by exemption (R. 8420.0122 Subpart 6). Coordination with affected Local Government Units or the BWSR is required for the WCA determination.

According to the application no staging or stringing setup areas will be placed within or adjacent to water resources, to the extent feasible. The Applicant could avoid major disturbance of individual wetlands and drainage systems during construction to the extent feasible. This could be done by spanning wetlands and drainage systems, where possible.

Access roadways could be designed to minimize wetland impacts by locating the areas of roadways near the edges of wetland areas, minimizing the width of the access roadways and construction material (gravel) where possible.

Floodplains

The 150-foot-wide ROW was used in calculating impacts to FEMA 100-year floodplains for the proposed routes and options. The total number of poles that to be placed in the 100-year floodplain was calculated by dividing the length of the transmission line span of the floodplain by the maximum distance between poles of 800 feet. Tables 5.8-10 and 5.8-11 identify the potential impacts to floodplains within the proposed routes and options.

Table 5.8-10. Potential Floodplain Impact Evaluation for Routes and Route Options

Routes/Options	Total Acreage of 100-year Floodplain	Number of Poles
Applicant Preferred ROW Occupancy	35	11
Applicant Preferred No ROW Occupancy	36	11
Route A	39	11

Table 5.8-11. Potential Floodplain Impact Evaluation for Route Option Alternatives

Alignment	Total Acreage of 100-year Floodplain	Number of Poles
Option 1		
Applicant Preferred ROW Occupancy	0	0
Applicant Preferred No ROW Occupancy	0	0
Option 1	0	0
Option 2		
Applicant Preferred ROW Occupancy	0.4	0
Applicant Preferred No ROW Occupancy	0.8	0
Option 2a	1	0
Option 2b	1	0
Option 3		
Applicant Preferred ROW Occupancy	0	0
Applicant Preferred No ROW Occupancy	0	0
Option 3	0	0
Amended Scope Options		
Applicant Preferred ROW Occupancy	33	11
Applicant Preferred No ROW Occupancy	33	11
Option AS-1	43	15
Option AS-2 ROW Occupancy	49	17
Option AS-2 No ROW Occupancy	0	0
Option AS-3	0	0

Coordination with local floodplain management departments would be required for construction of poles within FEMA 100-yr floodplains.

5.8.3 Mitigation

The following section discusses mitigation for surface waters, wetlands and floodplaines.

Surface Waters

Impacts could be avoided and minimized using appropriate sediment control practices and construction practices. These practices would be detailed in the NPDES permit and Stormwater Pollution Prevention Plan (SWPPP) that would be completed prior to the start of construction. In addition, Minn. Stat. 84.415 requires the Applicant to obtain a license from the MnDNR for passage of any utility over, under, or across public waters.

The mitigation for the each of the proposed routes is the same. The applicant could minimize the impacts to waterways in several ways. The Applicant has indicated that they do not intent to cross waterways with construction equipment unless necessary. Where waterways must be crossed to string new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices could help to prevent soil erosion. There are no anticipated significant, permanent impacts on surface water quality because impacts could be minimized and mitigated, disturbed soil could be restored to previous

conditions or better, and the amount of land area converted to an impervious surface is expected to be small.

Wetlands

Impacts to wetlands could be minimized through construction practices. Construction crews could maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil. Crews could avoid major disturbance of individual wetlands and drainage systems during construction. This could be accomplished by strategically locating new access roads and spanning wetlands and drainage systems where possible. When it is not feasible to span the wetland, construction crews could rely on several options during construction to minimize impacts:

- When possible, construction could be scheduled during frozen ground conditions;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route);
- The structures could be assembled on upland areas before they are brought to the site for installation; and
- When construction during winter is not possible, construction mats could be used where wetlands could be impacted; and
- Erosion control devices (e.g., silt fence, straw bales) could be installed to ensure that sediment does not enter the water feature.

Wetland vegetation could be restored following construction.

Floodplains

Impacts within FEMA floodplains are expected to be minimal and therefore no mitigation is being proposed.

5.9 NATURAL LAND RESOURCES

This section discusses the natural environment with respect to land based natural resources in the project area between North Dakota and Alexandria and the potential impacts on these resources. Natural Resources evaluated in this section include State Wildlife Management Areas (WMAs), Scientific Natural Areas (SNAs), National Wildlife Refuges (NWRs), Waterfowl Production Areas (WPAs), Conservation Easements, Flora, Fauna, Rare and Unique Natural Resources and Critical Habitat. Recreational aspects of WMAs and WPAs were addressed in Section 5.3 and biological aspects of these resources are presented in this section.

5.9.1 Affected Environment

State WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses. SNAs are

Minnesota State managed resources. SNAs focus on the preservation of ecological diversity and provide educational and scientific research opportunities. Several WMAs are located throughout the area between North Dakota and Alexandria and a small number of SNAs are present.

Federally owned or managed lands that protect wildlife habitat and nesting include National Wildlife Refugees (NWRs), WPAs, and U.S. Fish and Wildlife Service (USFWS) easements. These lands are owned and managed by the USFWS to conserve important natural resources. WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. Several WPAs and USFWS easements located throughout the area between North Dakota and Alexandria but there are no NWRs present.

Flora consists of the plants in the project region that make up vegetation communities and native vegetation. The flora discussion will also present noxious weeds as regulated under Minn. Stat., Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality.

Fauna is defined as the wildlife throughout the project area and consists of birds, mammals, fish, reptiles, amphibians, mussels, and insects, both resident and migratory, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, trout streams, and riverine habitats.

Critical Habitat is the natural environment that supports species. Designated habitat or conservation areas including managed areas such as MnDNR WMAs, USFWS WPAs and easements, and unmanaged areas including MnDNR designated Minnesota County Biological Survey (MCBS) biodiversity significance and rare native habitats and communities were analyzed within each route. All of these areas provide habitat for native vegetation, wildlife, and rare and unique resources.

MnDNR designated MCBS identifies unmanaged areas of significant biodiversity which identify significant and rare native habitats and communities. The MCBS Sites of Biodiversity Significance are ranked and organized into three classifications; moderate, high, and outstanding. Areas with moderate biodiversity significance contain significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery. Areas with high biodiversity significance contain sites with high quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species; the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota. MCBS sites are present in the area between North Dakota and Alexandria but the concentration of outstanding sites are located near the Applicant Preferred Alternative in northeastern Wilkin County and southeastern Clay County.

Rare and Unique Natural Resources include threatened and endangered species protected under Minn. Stat. 84.895, and under Section 7 of the Endangered Species Act and areas of biodiversity significance that could be associated with rare and unique species and habitats. These resources were identified using the MnDNR Natural Heritage Information System (NHIS). Threatened

and endangered species are often found within high quality rare and unique habitats and features (e.g., SNAs), which could also be identified using NHIS.

Flora

The proposed project routes occur within two ecological classification system (ECS) provinces, as described by the MnDNR and United States Forest Service: the Prairie Parkland Provinces on the west end of the routes and the Eastern Broadleaf Forest on the east end of the routes. (MnDNR, 2000a) The Applicant Preferred Route and Route A occur within three subsections of the ECS: Red River Prairie, Minnesota River Prairie, and the Hardwood Hills between North Dakota and Alexandria (MnDNR, 2000b)

The western most end of the Applicant Preferred Route between the Red River to just south of Fergus Falls occurs within the Red River Prairie ecological classification system subsection. The Applicant Preferred Route generally follows the prairie-forest border along the majority of its length between the area south of Fergus Falls and Alexandria. This area is known as the Alexandria Moraine Complex, which forms the western and southern boundary of the Hardwood Hills subsection. Agriculture is the predominant present-day land use but presettlement vegetation included maple-basswood forests interspersed with oak savannas, tallgrass prairies, and oak forests. According to the MnDNR, wetlands and lakes in poorly-drained potholes provide opportunities for recreation or wildlife habitat. Some upland forests remain, adjacent to lakes or on steep landscapes (MnDNR, 2010). Lakes within the area attract tourism.

The western end of Route A is located within the Red River Prairie and the northernmost portion of the Minnesota River Prairie. The eastern end of Route A also along the Alexandria Moraine Complex as it enters Alexandria but the majority of Route A traverses prairie lands. The eastern boundary of the Red River Prairie follows the eastern limits of continuous tall grass prairie vegetation at the time of Euro-American settlement. The majority of this subsection is a glacial lake plain and is generally flat and featureless interrupted by meandering waterways, and former beach ridges (MnDNR, 2010). Present-day land use is predominantly agriculture. The Minnesota River Prairie includes loamy ground moraine and some end moraines with a gently rolling topography (MnDNR, 2010). Presettlement vegetation was primarily tallgrass prairie and present-day land use is primarily agriculture.

Thus the routes occur within a mosaic of wooded areas, open prairie, and agricultural land with many scattered lakes, streams, and wetlands.

The westernmost ecological classification system subsection crossed by the Applicant Preferred Route and Route A is the Red River Prairie subsection. Presettlement vegetation within the Red River Prairie ECS subsection would have consisted of primarily tallgrass prairie. Common tallgrass prairie species would have included big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), prairie dropseed (*Sporobolus curtipendula*), and bluejoint grass (*Calamagrostis canadensis*), prairie cordgrass (*Spartina pectinata*), sedges (*Carex sp.*) and rushes (*Juncus sp.*) occurring within wet prairies. Forested portions of this subsection would have generally been limited to river floodplain corridors, that consisted of silver maple (*Acer saccharinum*) cottonwood (*Populus deltoides*), and American elm (*Ulmus americana*) trees and dense willow (Salix sp.) stands within the

floodplain (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b). The Red River Prairie was generally developed with fine textured lacustrine sediments, and thus a very flat landscape. Slight topographic variation would have provided microhabitats that differentiated between mesic and wet prairies, with dry prairies less common but occurring along sandy beach ridges (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b).

The Minnesota River Prairie subsection is traversed by Route A and is partially crossed by the Applicant Preferred Route. Presettlement vegetation within the Minnesota River Prairie ecological classification system subclass included primarily tallgrass prairie with many prairie potholes and depressional areas consisting of wet prairie. The Minnesota River Prairie subsection would have consisted of primarily tallgrass prairie, comprised of many of the same species described previously for the Red River Prairie subsection. The Minnesota River Prairie consists of rolling topography resulting from glacial moraines.

The Applicant Preferred Route and Route A both travel in portions of the Hardwood Hills ECS. Presettlement vegetation within the Hardwood Hills ECS consisted of primarily mesic oak-basswood and mesic maple-basswood forests consisting of northern red oak (*Quercus rubra*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*), with small lakes and wetlands scattered throughout the woodlands. In addition, a mosaic of savannah and open grasslands were also present throughout the western fringe of the Hardwood Hills ecological classification system subsection, along the prairie-forest border (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b). Woodlands and forests dominated sites sheltered from fire by the many lakes, rivers, and wetlands that occur throughout this area.

Noxious Weeds and Invasive Plant Species

Noxious weeds are regulated under Minn. Stat. Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality. Cropland may suffer losses in productivity following noxious weed infestations. Noxious weeds can be introduced to new areas through transporting propagating material like roots or seeds on contaminated construction equipment. Disturbed soil surfaces allow noxious weeds to become established. Eleven species of prohibited noxious weeds are recognized and prohibited by Minnesota Administrative Rules 1505.0730 (See Table 5.9-1 below). The Minnesota Noxious Weed Law also identifies 52 secondary noxious weeds. A county may select a weed or weeds from this secondary list to be placed on its noxious weeds list. If a secondary noxious weed is placed on a county noxious weed list, that weed must be controlled in that county. Applicants would continue to work with the state and counties crossed to identify locations along the ultimately permitted route where invasive species may occur, and identify measures that must be taken to control these species. The potential for noxious weed impacts as associated with the proposed routes and options would be similar.

Table 5.9-1. Minnesota Prohibited Noxious Weeds

Common Name	Scientific Name
Mustard, garlic	*Alliaria petiolata*
Hemp	*Cannabis sativa*
Plumeless Thistle	*Carduus acanthoides*
Musk Thistle	*Carduus nutans*
Canada Thistle	*Cirsium arvense*
Bull Thistle	*Cirsium vulgare*
Field Bindweed	*Convolvulus arvensis*
Leafy Spurge	*Euphorbia esula*
Purple Loosestrife	*Lythrum salicaria*
Perennial Sow Thistle	*Sonchus arvensis*
Poison Ivy	*Toxicodendron radicans*

Source: Minnesota Administrative Rules. 1505.0730 PROHIBITED NOXIOUS WEEDS. Subpart 1.State prohibited noxious weed list. Available online at: https://www.revisor.mn.gov/rules/?id=1505.0730

Fauna

Common wildlife species found within the region include large and small mammals, songbirds, waterfowl, raptors, fish, reptiles, amphibians, mussels, and insects. Wildlife throughout the project area consists of both resident and migratory species, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, and riverine habitats. Common mammals for these habitats include raccoon (*Procyon lotor*), skunk (*Mephitis spp.*), white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*), and rabbit (*Sylvilagus* spp.). Common birds include songbirds, hawks such as red-tailed hawk (*Buteo jamaicensis*) and Cooper's hawk (*Accipter cooperii*), waterfowl, and game birds such as pheasant (*Phasianus colchinus*) and turkey (*Meleagus gallopavo*)(MnDNR, 2008). Appendix D provides lists of common mammals, birds, reptiles, and amphibians that may occur in the area.

Throughout the area between North Dakota and Alexandria, areas exist where high-quality wildlife habitat occurs naturally or is being managed. Designated habitat or conservation areas including managed areas such as MnDNR WMAs; USFWS WPAs and conservation easements; and unmanaged areas including MnDNR-designated MCBS biodiversity significance and rare native habitats and communities were analyzed within the proposed routes.

While agricultural land uses are an important component of wildlife resources in the area between North Dakota and Alexandria, land managed to promote wildlife habitat can provide for higher species diversity and larger populations than surrounding landscapes that are intensively used for agriculture.

The Migratory Bird Treaty Act of 1918 (16 United States Code (USC) 703-712) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The Fish and Wildlife Conservation Act of 1980 (16 USC 2901-2911) affords protection to Birds of Conservation Concern. Migratory birds and Birds of Conservation

Concern are an important component of biodiversity in North America. Many species are known to occur in the project area in a variety of upland and wetland habitats. Additionally, the Bald and Golden Eagle Protection Act (16 USC 668-668C), which was enacted in 1940, specifically prohibits the taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any part, nest, or egg of these eagles.

5.9.2 Potential Impacts

This section presents the impacts the project could have on land resources where potential impacts may occur.

Flora

Flora throughout most of the area between North Dakota and Alexandria is typical of that normally found in an agricultural setting. The majority of the Applicant Preferred Route occurs along existing rights-of-way, including roads, and is also often adjacent to cultivated row crops. Given that the vegetation communities that occur in these areas are regularly disturbed, impacts due to construction are not anticipated to substantially disrupt vegetative community quality or function. Route A does not follow major existing infrastructure and is generally along property lines or local roadways. Applicants have indicated that they would span areas containing native plant communities wherever possible or practicable. Applicants have also indicated that they would work to avoid and minimize direct impacts on habitat and conservation areas to the extent feasible.

Temporary impacts to flora would take place most intensively at the structure locations. Temporary impacts are estimated at one acre per pole. Permanent vegetative changes would take place within the right-of-way. Trees and shrubs that may interfere with maintenance and the safe operation of the transmission line would not be allowed to establish within the right-of-way. Co-locating with existing corridors through wooded areas would reduce the impact on trees and habitats they support. Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the right-of-way after construction. In addition, permanent impacts would be required at each pole location. The permanent impacts are estimated at 55 square feet per pole. Vegetation is comprised of wooded and non-wooded lands that are not agriculture. Non-wooded lands are designated as emergent herbaceous wetlands and urban/recreation grasses and wooded lands are designated as deciduous forest, evergreen forest, mixed forest, woody wetlands by the National Land Cover Data (NLCD). Refer to Table 5.9-2 for estimated temporary impacts to vegetation for the proposed route options.

Table 5.9-2. Temporary and Permanent Impacts to Non-Agricultural Vegetation

Route/Option	Estimated Number of Poles	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (1,000 SF Per Pole) SF	Permanent Impacts (1,000 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	35	35	1,950	0.04
Applicant Preferred No ROW Occupancy	41	41	2,229	0.05
Route A	35	35	1,904	0.04
Route Options				
Route Option 1				
Applicant Preferred ROW Occupancy	0	0	25	0
Applicant Preferred No ROW Occupancy	0	0	22	0
Option 1	1	1	74	0
Route Option 2				
Applicant Preferred ROW Occupancy	5	5	257	0
Applicant Preferred No ROW Occupancy	5	5	282	0
Option 2a	5	5	249	0
Option 2b	6	6	342	0
Route Option 3				
Applicant Preferred ROW Occupancy	2	2	113	0
Applicant Preferred No ROW Occupancy	2	2	134	0
Option 3	3	3	161	0
Amended Scope Options				
Option AS-1	2	2	89	0
Applicant Preferred ROW Occupancy	3	3	175	0
Applicant Preferred No ROW Occupancy	3	3	187	0
Option AS-2 ROW Occupancy	1	1	76	0
Option AS-2 No ROW Occupancy	2	2	87	0
Option AS-3	0	0	0	0

Source: NCLD, 2001

None of the alternatives represent major permanent impacts to vegetation.

Fauna

There is potential for the displacement of wildlife and loss of habitat from construction of the propose routes; however, it is likely species would only be displaced a short distance since there is similar habitat close by. Wildlife could be impacted in the short-term within the immediate area of construction. The distance that animals will be displaced will depend on the species. Additionally, these animals will be typical of those found in agricultural and urban settings and should not incur population level effects due to construction.

Habitat fragmentation could be caused by the transmission line bisecting habitats. Where the proposed transmission line follows existing features such as roads, transmission lines, or field

lines, very few new corridors will be created as a result of the project. In any case, areas of sensitive habitat will be spanned as much as possible. Impacts from habitat fragmentation can extend beyond the area disturbed by a new route. Fragmentation affects some wildlife species by creating barriers to daily migrations. Predation can increase among animals that are forced out of cover as they search for food, and decreases the distance that predators may have to travel to penetrate large habitat areas. Some species depend on large areas of undisturbed habitat and their survivability decreases as fragmentation increases.

Temporary impacts on fauna will take place most intensively at the structure locations (requiring one acre per structure). Staging areas and stringing areas will also temporarily impact fauna within the project area. Grading could occur at the staging areas if they are not located in previously disturbed sites. Through right-of-way access will be limited to 20 feet in width. In forested areas, clearing will be limited to only those trees necessary to permit the passage of equipment and the area will be restored to original condition.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission line. Avian collisions are a possibility after the completion of the transmission line but the larger size of conductors associated with transmission lines compared to distribution lines would result in higher visibility, potentially decreasing collisions. Waterfowl typically are more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas and wetlands or open water, which serve as resting areas. In these areas, it is likely that waterfowl and other birds will be traveling between different habitats, potentially increasing the likelihood of avian conflicts with the transmission line. Because of the high density of birds in such nesting sites, disturbance to the site has the potential to impact individuals. Avian species reproductive success is not likely to be impacted.

Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. Applicants' transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to this project.

Because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries will be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

Rare and Unique Natural Resources/Critical Habitat

Through coordination with the USFWS and MnDNR, two areas of concern to both agencies along the Applicant Preferred Route and one area of concern along Route A were identified between North Dakota and Alexandria. These two areas were identified as being primary migration and staging areas for high concentrations of waterfowl and other migratory birds. One area is between Pomme de Terre Lake, Pelican Lake, and Lake Christina. This chain of lakes is approximately 25 miles northwest of Alexandria on both sides of Interstate 94. The USFWS has indicated that 20 percent of the canvasback ducks (*Aythya valisineria*) population that migrate across the U.S. congregate within the area extending between these water bodies. The other area identified is approximately 36 miles north of Alexandria along Interstate 94 between North Ten Mile Lake, Mineral Lake, and Swan Lake. Concern was expressed by both agencies regarding

these two locations as they would have the highest potential along the Applicant Preferred Route for avian collisions. The agencies indicated this potential would also be the highest during inclement weather and low flight over Interstate 94 between the lakes.

Electrocution of large birds, such as raptors, is a concern typically related to distribution lines. Route A would avoid the areas of concern impacted by the Applicant Preferred Route by traveling south of the concentration of larger lakes to Alexandria. However, one area of concern identified by both agencies along Route A and related to high waterfowl and migratory bird concentrations is where the route crosses the Mustinka River in Elbow Lake Township. The Applicant would continue to coordinate with the USFWS and MnDNR to identify any additional areas of concern.

Rare and unique communities and habitats occur throughout the area between North Dakota and Alexandria. Rare and unique communities include federal waterfowl production areas and state WMAs, SNAs, parks, trails, and MCBS sites of biodiversity significance. Data from the USFWS, MnDNR, and private organizations were reviewed to determine areas containing rare or unique communities and habitats within the proposed routes. Federal lands along the routes include WPAs, which are included within the NWR system and are managed by the USFWS, preserve wetlands and grasslands critical to waterfowl and other wildlife; and wetland, grassland, and Farmers Home Administration easements, which are managed by the USFWS to protect the prairie pothole community and wetlands on farmlands, respectively. State-owned lands along the routes include WMAs and easements managed by the Board of Water and Soil Resources (BWSR). In addition, the MnDNR Division of Ecological Resources MCBS data were reviewed to determine if there were areas with moderate, high, or outstanding biodiversity significance within the routes.

MCSB areas of moderate, high, and outstanding biodiversity significance and MnDNR-listed natural communities are areas known to be capable of supporting rare and unique species. The number of structures placed in these areas will either be avoided or minimized by maximizing the span across them. Where structure placement cannot be avoided in these sensitive communities, special status species associated with these habitats could be affected. Applicants will also span any habitats where unique plant communities have been recorded or are likely to occur, wherever possible. If construction within these resources cannot be avoided, surveys would be conducted and the appropriate agencies will be consulted to assure impacts to listed species are avoided or minimized.

Thirty-nine USFWS easements, five WMAs, seven Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, three MCBS Railroad Prairies, five BWSR RIM Easements, and four Native Plant Communities are crossed by the Applicant Preferred Route. No WPAs or SNAs are crossed by the Applicant Preferred Route between North Dakota and Alexandria.

Eleven USFWS easements, one WMA, three Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, sixteen MCBS Railroad Prairies, one BWSR RIM Easements, and two Native Plant Communities are crossed by Route A. No WPAs or SNAs are crossed by Route A.

Table 5.9-3 below identifies the acreage of impact to sensitive management areas and conservation easements within proposed routes and ROW. Route Options and Amended Scope Options are discussed after the table.

Table 5.9-3. Habitat Impact Evaluation for Routes

Habitat Classification	Applicant Preferred ROW Occupancy		Applicant Preferred No ROW Occupancy		Route A	
	Route (Acres)*	ROW (Acres)*	Route (Acres)*	ROW (Acres)*	Route (Acres)*	ROW (Acres)*
WPAs	0	0	0	0	0	0
WMAs	166	0	166	0	14	0
USFWS Easements						
Wetlands	811	56	811	63	73	8
Grasslands	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	0.08	0
Other	0	0	0	0	54	4
MCBS Sites of Biodiversity Significance						
Moderate	12	0.5	12	0.5	22	3
High	0	0	0	0	0	0
Outstanding	0	0	0	0	0	0
MCBS, Native Plant Communities	9	0	9	0	18	1
MCBS Railroad Right-of-Way Prairies						
Fair	0	0	0	0	21,370’	4,317’
Good	1,270’	<1’	1,270’	15’	44,311’	184’
Very Good	0	0	0	0	0	0
SNAs	0	0	0	0	0	0
Minnesota Land Trust Conservation Easements	12	3	12	4	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	53	0	53	0	4	0
Calcareous Ferns						
Outstanding	0	0	0	0	0	0

**Unless noted, i.e. MCBS Railroad Right-of-Way Prairies are given in feet.*

Despite paralleling more existing rights-of-way, the Applicant Preferred Route impacts more natural resources than Route A between North Dakota and Alexandria. The Applicant Preferred Route crosses 28 more USFWS easements, four more WMAs, four more Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, four more BWSR RIM Easements, and two more Native Plant Communities. Route A impacts 13 more MCBS Railroad Prairies than the Applicant Preferred Route and has in general has much fewer overall impacts. Despite

impacting a fewer number of MCBS Sites and Native Plant Communities, Route A has a greater amount of these resources within its ROW than the Applicant Preferred Routes.

With limited exception the Route Options did not have different impacts on any resources than the Applicant Preferred Route or Route A. The differences in impacts that occur are described herein. A small amount of WMA land, approximately 0.2 acre, is located within the Option 2a and 2b ROW which would not be impacted by the Applicant Preferred Routes.

The Option 1 ROW would have virtually no impacts on USFWS wetland easements while the Applicant Preferred ROW Occupancy alignment would impact eleven acres and the No Occupancy alignment would impact thirteen acres. Option 2a ROW would include approximately two acres of USFWS wetland easements and Option 2b would include approximately ten acres as opposed to the Applicant Preferred ROW Occupancy and No Occupancy alignments which include 14 acres in the same area.

With limited exception the Amended Scope Options did not have different impacts on any resources than the Applicant Preferred Route. Overall, AS-1 impacts more resources than AS-2 or the Applicant Preferred Route at this location. AS-1, AS-2 and the Applicant Preferred ROW Occupancy and No Occupancy ROW all include approximately one-half acre of an MCBS Site designated as moderate within their proposed ROWs. AS-1 impacts one BWSR RIM Easement. Approximately one acre of the BWSR RIM Easement would be located within the AS-1 Route and approximately 0.4 acres would be impacted by the AS-1 ROW. This easement would not be impacted by AS-2 or the Applicant Preferred Route. The AS-2 Route and the Preferred Route both impact the same distance of MCBS Railroad ROW Prairies, which are not impacted by AS-1 however none of the prairie is located within any ROW. AS-1 includes 12 acres of Minnesota Land Trust Easements within its route that are not present in AS-2 or the Applicant Preferred Route and approximately one half acre within its ROW. Further, a Native Plant Community would be impacted by AS-1; including 12 acres within the AS-1 Route that would not be impacted by AS-2 or the Applicant Preferred Route. AS-3 is not known to impact any additional natural resources.

Protected Species

This section discusses species protected under Section 7 of the Endangered Species Act and Minn. Stat. 84.895. Species protected under the Endangered Species Act include those listed as federally threatened or endangered. Species protected under state statute are those listed as special concern, threatened, and endangered. Table 5.9-4 below lists the state listed species found within one mile of the proposed routes, within the Route corridor, and within the proposed ROW for each route and option as applicable. No federally listed species have been identified within one mile of the proposed routes, route options, or amended scope options.

Table 5.9-4. Protected Species Occurrences Associated with the Applicant Preferred Route

Common Name	Scientific Name	Number of Occurrences within 1,000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	1	0	SC	S3B,S3N
Greater prairie chicken	*Tympanuchus cupido*	2	0	SC	S3
Invertebrates					
Black sandshell	*Ligumia recta*	2	0	SC	S3
Creek heelsplitter	*Lasmigona compressa*	1	0	SC	S3
Fluted-shell	*Lasmigona costata*	1	0	SC	S3

Table 5.9-5. Protected Species Occurrences Associated with Route A

Common Name	Scientific Name	Number of Occurrences within 1,000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
Plants					
Small White Lady's slipper	*Cypripedium candidum*	1	1	SC	S3

Table 5.9-6. Protected Species Occurrences Associated with the Amended Scoping Options

Common Name	Scientific Name	Number of Occurrences within 1,000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
AS-1					
Plants					
Wet Prairie (Northern)	*Wet Prairie (Northern) Type*	1	0	NA	S3
Applicant Preferred Route					
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	1	0	SC	S3B,S3N
Greater prairie chicken	*Tympanuchus cupido*	1	0	SC	S3
AS-2					
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	1	0	SC	S3B,S3N
Greater prairie chicken	*Tympanuchus cupido*	1	0	SC	S3

One state-listed threatened, endangered or candidate species was identified within the Route A ROW between North Dakota and Alexandria. No state-listed threatened, endangered or candidate species were identified within the proposed ROW for any other routes or options. The types of impacts to protected species would be similar to those described for general fauna.

5.9.3 Mitigation

Flora

The transmission line alignment and structure locations will be determined in final design and mitigation measures may include spanning sensitive flora or vegetation. The disturbance necessary for construction may cause a reduction of habitat within the ROW for some wildlife. The effect diminishes after construction as vegetation reestablishes. If the ROW is then managed for maximum vegetation cover, there should not be a significant long-term reduction in habitat that is present under the existing line. Areas disturbed due to construction activities could be restored to pre-construction contours and reseeded with a seed mix recommended by local MnDNR management and that is certified to be free of noxious weeds.

The Applicants have indicated that they intend to continue to work with the MnDNR and USFWS to minimize and avoid impacts to properties where native vegetation occurs and is managed. The proposed routes would avoid and minimize impacts on properties where native vegetation occurs, wherever possible. When native vegetation communities cannot feasibly be spanned, Applicants intend to work to minimize the number of permanent structures that may impact the native community. Naturally managed properties disturbed during construction could

be restored to pre-construction contours and could be reseeded with a seed mix recommended by agency staff or required according to required project permits. The applicant is proposing to restore disturbed land to pre-construction contours and stabilized using a seed mix specified within the project's NPDES permit requirements.

Similarly, the Applicant would continue to work with the MnDNR and USFWS to minimize and avoid impacts on sensitive flora along the route and intend to avoid and minimize impacts on any areas known to contain native vegetation, wherever possible.

Construction equipment can spread noxious weed-propagating material to new locations.the applicant intends to comply with Minnesota noxious weed laws as described in Minn. R. Ch. 1505 and intend to observe county weed lists where they occur. Around substations and switches, Applicants intend to provide for weed control in a manner that does not allow for the spread of weeds onto adjacent agricultural land during operation of the transmission line.

Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the ROW after construction.

Crews could attempt to limit ground disturbance wherever possible during the construction of the transmission line and substations. However, areas of disturbance are expected during the normal course of work, which may occur over several weeks in any one location. As construction on each parcel is completed, disturbed areas could be restored to their original condition to the maximum extent practicable. The ROW agent would contact each property owner after construction is completed to see if any damage has occurred as a result of the project. If damage has occurred to crops, fences or the property, Applicants would reimburse the landowner for the damages sustained. In some cases, Applicants may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Resilient species of common grasses and shrubs typically reestablish areas disturbed during construction with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line route may require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences; and
- Straw bales.

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

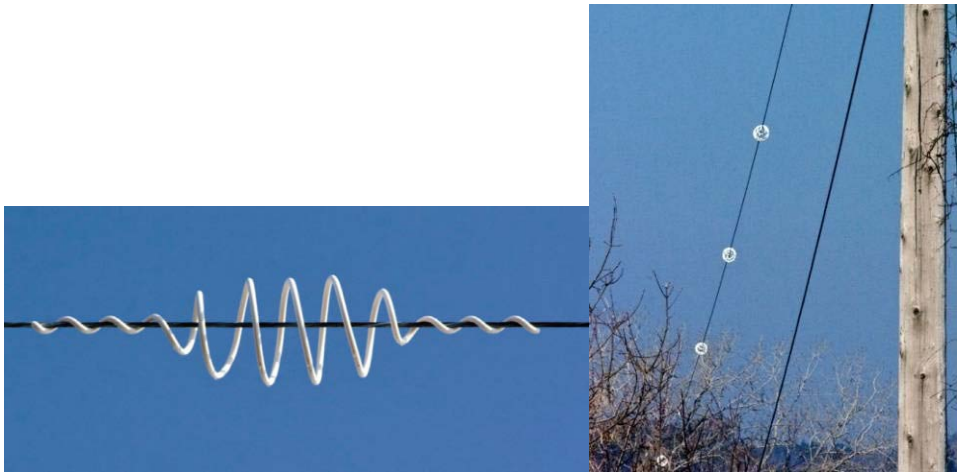
Fauna

To mitigate possible impacts on wildlife, the Applicants are proposing to span designated high quality wildlife habitat areas to the extent feasible. In areas where complete spanning is not

possible, Applicants intend to minimize the number of structures placed in high quality wildlife habitat, and intend to work with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures such as leaving vegetation buffers adjacent to waterways to provide species movement, construction mats to avoid soil compaction, and reseeding. Also, Applicants have routed the Applicant Preferred Route such that the majority is co-located with the Interstate 94 corridor or other existing rights-of-way that have been previously disturbed; therefore, minimizing additional tree clearing that could increase fragmentation. Similarly, because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries will be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

According to the Applicant, avian issues at water body crossings and other areas of concern would be addressed by working with the USFWS and MnDNR to identify any areas that may require marking the proposed transmission line, such as with the use of bird flight diverters, in an effort to reduce the likelihood of collisions. In 2002, Xcel Energy entered into a voluntary Memorandum of Understanding with the USFWS to work together to address avian issues throughout its service territories. The development of Avian Protection Plans for each state the Company serves, including Minnesota, is currently underway to help support the Memorandum of Understanding. This Memorandum of Understanding has been approved by the USFWS. Additionally, to mitigate possible impacts on wildlife, the Applicant is proposing to avoid areas known as major flyways or migratory resting spots, and span designated high quality wildlife habitat areas to the extent feasible. In areas where complete spanning is not possible, the Applicant intends to minimize the number of structures placed in high quality wildlife habitat, and is proposing to work with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures such as adding transmission line shield wires to the lines.

Diagram 5-7. Transmission Line Shield Wires



Source: CapX2020. 2009. Birds and Power Lines. CapX2020 Fact Sheets.

The Applicant is proposing to restore disturbed areas due to construction activities to pre-construction contours and is proposing to reseed with a MnDNR-recommended seed mix that is free of noxious weeds.

Rare and Unique Natural Resources/Critical Habitat

As discussed in previous sections, Applicants have routed the Applicant Preferred Route such that the majority is co-located with existing rights-of-way, therefore minimizing additional tree clearing that could increase fragmentation of sensitive habitats.

In addition, the Applicants intend to follow standard erosion control measures identified in the Minnesota Pollution Control Agency's (MPCA) Stormwater Best Management Practices Manual to maintain sound water and soil conservation practices during construction of the project to minimize soil erosion, and protect topsoil and adjacent water resources. These measures include using silt fencing, slope breaks, containing excavated material, protecting exposed soil, and stabilizing restored soil. The Applicant is proposing to implement these measures to minimize erosion and sedimentation impacts to adjacent water resources. The Applicants are proposing to complete construction according to NPDES permit requirements.

No construction activities are being proposed within or immediately adjacent to waterbodies or wetlands, to the extent feasible. Applicants are proposing to avoid major disturbance of individual wetlands and waterbodies during construction. The Applicant is proposing to span wetlands and waterbodies.

Where water resources must be crossed to string new conductors and shield wires, workers may walk across, use boats, drive equipment across ice in the winter, or use temporary bridges to cross over or through the wetland or water body. Wetland and water body boundaries along the construction corridor could be identified and marked prior to construction to assure these sensitive areas are protected accordingly. Setbacks could be established to identify safe fueling areas and staging areas a sufficient distance from waterbodies and wetlands when possible or as required by permit conditions. These construction practices could help to prevent siltation within waterbodies and wetlands and minimize the risk of an inadvertent release of harmful fluids due to fueling and lubricating of equipment.

Avoidance and minimization could be accomplished by strategically locating new access roads outside of wetland and water body boundaries and spanning wetlands and waterbodies, where possible. When it is not feasible to span a water resource, or avoid access to the right-of-way through a wetland or water body, construction crews could rely on several options during construction to minimize impacts, including:

- When possible, construction could be scheduled during frozen ground conditions;
- When construction during winter is not possible, construction mats could be used as needed to minimize temporary impacts due to construction in a water resource;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route); and
- The structures could be assembled in upland areas before they are installed within a water resource to minimize temporary impacts due to structure installation.

Protected Species

Where possible, impacts on these species could be prevented by avoiding known locations and potentially suitable habitats during finalization of the transmission line alignment. Where structure placement and/or spanning of transmission lines cannot be avoided in suitable habitats, listed species associated with these habitats could be affected. If project activities within potentially suitable habitat cannot be avoided, surveys could be conducted and the MnDNR could be consulted to ensure impacts on listed species are avoided or minimized.

The special status species associated with wetlands, stream banks, and rivers could be impacted by placement of structures within these habitats, or by increased erosion and sedimentation that could occur if appropriate mitigative measures or Best Management Practices are not employed. Therefore, the Applicant could span rivers, streams, and wetlands throughout the project area to the extent practical, implement the appropriate mitigation measures or practices such as using construction mats to avoid soil compaction, and maintain sound water and soil conservation practices during construction of the project to protect topsoil and adjacent water resources, minimizing soil erosion and sedimentation. However, if it is not feasible to span, surveys could be conducted to determine the presence of state-listed species or suitability of habitat for such species, and coordination could occur with the appropriate agencies to avoid and minimize any associated impacts.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas would be to span all streams and rivers. Construction mats are also placed in wet or soft soil locations and narrow ditches to minimize disturbances. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site. Diagram 5-8 shows an example of construction mats.

Diagram 5-8. Example of Construction Mats

Source: Route Permit Application for the Monticello to St. Cloud 345 kV Transmission Line Project.

5.10 AIR QUALITY

This section discusses the potential for ozone and nitrogen oxide production from transmission lines, and temporary air quality impacts associated with construction activities. In general, transmission lines and substations do not produce significant amounts of air pollutants. During construction, it is possible that fugitive dust can be created resulting from soil disturbance and released into the atmosphere. The entire project area is in attainment with National and Minnesota Ambient Air Quality Standards for all criteria pollutants.

5.10.1 Affected Environment

The affected environment is the area near the transmission line and substations, which travels through portions of Clay, Douglas, Grant, Otter Tail, Pope, Stevens, Traverse, and Wilkin Counties, depending on the alternative. All counties are classified as NAAQS attainment areas for all criteria air pollutants (Carbon Monoxide - CO, Lead - Pb, Nitrogen Dioxide - NO_x, Particulate Matter (PM_{10} and $PM_{2.5}$), Ozone – O_3, and Sulfur Dioxide – SO_2).

Currently, no ambient air monitoring data are collected for any pollutants within these counties.

Table 5.10-1. National Ambient Air Quality Standards

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.	
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	
	35 ppm (40 mg/m^3)	1-hour[1]	None	
Lead	0.15 μg/ m^3	Rolling 3-Month Average	Same as Primary	
	1.5 μg/ m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 μg/ m^3)	Annual (Arithmetic Mean)	Same as Primary	
	0.100 ppm (189 μg/ m^3)	1-hour[8]	None	
Particulate Matter (PM_{10})	150 μg/ m^3	24-hour[2]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 μg/ m^3	Annual[3] (Arith. Mean)	Same as Primary	
	35 μg/ m^3	24-hour[4]	Same as Primary	
Ozone	0.075 ppm (2008 standard)	8-hour[5]	Same as Primary	
	0.08 ppm (1997 standard)	8-hour[6]	Same as Primary	
	0.12 ppm	1-hour[7] (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arith. Mean)	0.5 ppm	3-hour[1]
	0.14 ppm	24-hour[1]		
	0.075 ppm	1-hour[9]	0.5 ppm (1300 μg/m^3)	

Source: www.epa.gov/air/criteria.html - Information Retrieved June 25, 2010.

Notes:

[1] *Not to be exceeded more than once per year.*

[2] *Not to be exceeded more than once per year on average over 3 years.*

[3] *To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m^3.*

[4] *To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m^3.*

[5] *To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.*

[6] *To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard (0.08 ppm) to the 2008 ozone standard (0.075 ppm). EPA is in the process of reconsidering the standards set in 2008.*

[7] *The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact Areas. The 1-hour ozone standard does not apply to the project area.*

[8] *To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.*

[9] *To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.*

Minnesota also has established AAQS. For many pollutants and averaging periods, the MNAAQS have been made identical to NAAQS. There are subtle differences, and for some pollutants, Minnesota has a standard while no standard exists at a national level, including for hydrogen sulfide and particulate matter. While total particulate matter still has an official standard, it is enforced more loosely with a primary emphasis on standards for PM_{10} and $PM_{2.5}$). For a complete listing on MNAAQS, please visit Minnesota's Office of the Revisor of Statutes' website (https://www.revisor.mn.gov/rules/?id=7009.0080).

Relative to the 2008 ozone standard, Minnesota Pollution Control Agency recommended to USEPA in a March 10, 2009 letter that the entire state be designated as attainment for the 2008 ozone standard. (Appendix F) EPA is in the process of reconsidering the standards set in 2008 and in January 2010 proposed to lower the 8-hour standard to somewhere between 0.060-0.070 ppm. If the standard were to be lowered to 0.060 ppm, with one exception, all counties that currently monitor for ozone in Minnesota would be classified in part or in whole as nonattainment based on 2006-2008 data , which indicate that 3-year average ozone levels in Minnesota ranged from 0.057 to 0.069. Given that ozone is a regional pollutant by nature, it is safe to assume that any of the counties involved in this project would ultimately be classified as nonattainment for a 0.060 ppm standard based on 2006-2008 data if monitoring were established for ozone within their boundaries. If the standard were to be lowered to 0.065 or 0.070 ppm, it is unclear as to which of the non-monitored counties involved in this project, if any, would be classified as nonattainment.

The only pollutants of concern relating to transmission line operations are O_3 and NO_x. However, transmission lines and substations do not produce significant amounts of these air pollutants, as the O_3 and NO_x emissions from a 345 kV transmission line result from corona effects and are very minor.

Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors and can produce ozone and oxides of nitrogen in the air surrounding the conductor. For a 345 kV transmission line, the conductor gradient surface is usually below the air breakdown level. Typically, some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Ozone is not only produced by corona, but also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone from chemicals in the atmosphere. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short lived.

5.10.2 Potential Impacts

Following is a description of impacts and mitigation with respect to air quality. The impacts and mitigation would be the same for the various alternative routes, options, and substations.

There are no differences in attainment status in any of the counties along either Route. The route chosen should not impact air quality in a meaningful way.

There are no differences in attainment status in any of the counties along any of the options. The options chosen should not impact air quality in a meaningful way.

During construction of the proposed transmission line and substation, there will be limited emissions due to exhaust from vehicles and other construction equipment and fugitive dust from right-of-way clearing. Temporary air quality impacts caused by construction-related emissions are expected to occur during this phase of activity. Exhaust emissions, primarily from diesel equipment, will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts on the surrounding environment will be minimal because of the short and intermittent nature of the exhaust emission and dust-producing construction phases.

5.10.3 Mitigation

According to the Applicant, Best Management Practices (BMPs) will be used to minimize or avoid temporary impacts from fugitive dust and other construction-related emissions. These BMPs may include:

- Oil and other petroleum derivatives will not be used for dust control. Speed limits will be enforced, based on road conditions, to reduce dust problems.
- Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, will not be operated until repairs or adjustments are made.
- Burning or burying waste materials on the ROW will not be permitted and all waste materials shall be disposed at permitted waste disposal areas or landfills.
- The emission of dust into the atmosphere during construction will be minimized to the extent practical during the manufacturing, handling, and storage of concrete aggregate. Methods and equipment will be used as necessary for the collection and disposal or prevention of dust during these operations. The methods of storing and handling cement and cement additives will also include means of minimizing atmospheric discharges of dust.

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6.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION - ALEXANDRIA TO SAUK CENTRE

Section 6 analyzes the human and environmental impacts associated with each route alternative between Alexandria and 365th Street east of Sauk Centre. Two route alternatives were analyzed within this area which includes Douglas, Pope, Todd, and Stearns counties in Minnesota. Both routes begin at Highway 29, just south of Alexandria. Four route options associated with both route alternatives are also analyzed within this section. A summary of the Impacts is included in Appendix J.

In general, a 1,000-foot route width is used to describe the affected environment for each resource (see Section 1.5 for a discussion of areas wider or narrower than the general 1,000 foot width). An assumed 150-foot ROW within the route is used to determine potential impacts for each route alternative and each route option alternative. Evaluation of each route option includes a comparison to the corresponding section of the Applicant Preferred Route or Route A, with the exception of Route Option 7. The affected environment for Option 7 is the corresponding segment of Route A as these two alternative routes cover the same area.

6.1 HUMAN SETTLEMENT

Human settlement includes the developed portion of the environment, social and economic characteristics, land use, and associated development issues that affect land use.

6.1.1 Affected Environment

The study area for the affected environment is generally the 1,000-foot transmission line corridor for each proposed route alternative and surrounding area. The affected environment for Human Settlement describes the existing conditions associated with human influenced development in the area such as the current socioeconomic conditions and the general land development patterns. This section discusses these conditions within the affected counties and municipalities that would be crossed by the proposed transmission line.

Socioeconomic Resources

The proposed routes are located in Douglas, Pope, Todd, and Stearns counties in Minnesota. These counties will likely experience temporary minimal effects on local employment and economies from the construction and operation of the proposed project. The four-county area where the routes cross through each county is primarily rural. The affected area in Douglas County contains the largest population due to its proximity to the city of Alexandria. According to the U.S. Census, the largest population centers in the affected area include the city of Alexandria in Douglas County and Sauk Centre in Stearns County.

The population of the townships where the routes are located best represents the population of the affected environment since these are the smallest geographic areas for which population estimates are available. As shown in Table 6.1-1, the total population within the townships which would be affected by the proposed routes was estimated in 2008 to be 21,716. The population of the affected townships represents 10 percent of the four-county area. In Douglas County, the

affected townships represent 53 percent of the total county population, most of which is located in the city of Alexandria and La Grand Township, west of the city.

Table 6.1-1. Population Characteristics of Townships in Study Area

County*	Total County 2008 Population Estimate	2008 Population within Study Area Townships and Cities	
		Total	Percent of County Population
Douglas	36,224	19,053	53
Pope	10,950	293	3
Todd	23,978	308	1
Stearns	147,773	2,062	1
Total	218,925	21,716	10

Source: U.S. Census, 2008 Population Estimates

Table 6.1-2 shows the 2000 population broken down by racial category for the townships within the study area. The population of the townships affected in each county was nearly 100% white in 2000.

Table 6.1-2. 2000 Racial Characteristics of Townships in the Study Area

County	Population*	White or Caucasian	Black or African American	American Indian, Alaska Native	Asian	Other Races
Douglas	14,825	14,647 (98.8%)	42 (0.3%)	42 (0.3%)	68 (0.5%)	26 (0.1%)
Pope	277	277 (100%)	0	0	0	0
Todd	312	308 (98.7%)	0	3 (1.0%)	1 (0.3%)	0
Stearns	2,009	1,998 (99.5%)	1 (0.05%)	4 (0.2%)	2 (0.1%)	4 (0.2%)

**Represents population of townships within each county that are affected by a route alternative.*
Source: U.S. Census Bureau, Census 2000

Income characteristics for the study area are presented at a county level in Table 6.1-3. Per capita personal income for the counties in the study area remains below the state average. With the exception of Stearns County where St. Cloud is located, the rate of income increase for each county since 1998 was substantially higher than the state.

Table 6.1-3. Per Capita Personal Income

Location	1998	2003	2008	% Change 1998-2008	Percentage of Individuals Below Poverty Level 2000
Douglas County	$22,822	$22,822	$36,655	21.7	8.5
Pope County	$21,956	$29,548	$37,542	29.5	8.8
Todd County	$17,898	$22,467	$28,176	19.3	12.9
Stearns County	$23,358	$28,493	$34,328	11.3	8.7
State of Minnesota	**$29,273**	**$35,281**	**$42,953**	**11.2**	**7.9**

Source: Minnesota Office of the State Demographer, Income estimates, 2008: County level income data for Minnesota; U.S. Census Bureau, 2000 Census, General Demographic Characteristics.

Historically, the economies of the affected counties have been based in agricultural production. The economic base for counties and communities within the study area are manufacturing, service establishments, and agricultural industries. The smaller percentage of available employment in these counties can explain the higher poverty rates compared to the state. The largest industry in terms of employment within the project area is manufacturing, followed by wholesale trade, retail, and food service.

Land Use and Zoning

The land use study area includes all land within the routes and adjacent properties. Land uses in this area include agricultural, residential, and commercial. Agricultural uses predominate; commercial uses are located in and adjacent to the incorporated areas of Alexandria and Sauk Centre where development densities are higher. Interspersed commercial and industrial uses occur along Interstate 94 and other existing roadways. Zoning near these incorporated areas include residential, commercial, and industrial. Existing land use and zoning outside of the cities is predominantly agricultural or undeveloped land; however, low density, single-family, or rural residential uses also occur. Table 6.1-4 shows the area of agricultural, residential, and commercial/industrial zoning within the routes and route options.

Table 6.1-4. Zoning Within Each Route

Route/ Option	Acres and Percentage of Zoned Land Use					
	Agriculture	Residential	Commercial/ Industrial	Municipal	Recreation	Special Agricultural
Route Alternatives						
Applicant Preferred	2,668 (58%)	752 (16%)	583 (13%)	0 (0%)	572 (13%)	0 (0%)
Route A*	4,472 (77%)	681 (12%)	114 (2%)	0 (0%)	258 (4%)	261 (5%)
Route Options						
Option 4	453 (73%)	75 (12%)	0 (0%)	0 (0%)	95 (15%)	0 (0%)
Option 5	368 (99%)	0 (0%)	0 (0%)	5 (1%)	0 (0%)	0 (0%)
Option 6	1,469 (99%)	0 (0%)	8 (1%)	0 (0%)	0 (0%)	0 (0%)

**Includes area within Option 7.*

Local zoning districts traversed by the proposed routes include mostly agricultural-related classifications although residential, commercial, and industrial zoning districts are also affected. More than half of the Applicant Preferred Route corridor is zoned for agricultural use, while about three-quarters of land use within Route A is zoned for agricultural use. Residential and commercial/industrial zoning encompass about 25 percent of the Applicant Preferred Route corridor. Much less commercial zoning is present with Route A due to its location away from Interstate 94. Recreation zoning occupies a little over 10 percent of each route corridor. Residential, commercial and industrial, and recreation zoning districts also encompass approximately 25 percent of Route A.

The entire study area is zoned by the county or city zoning jurisdictions. Douglas, Pope, Todd, and Stearns counties administer zoning over their respective unincorporated areas. The cities of Alexandria and Sauk Centre administer zoning regulations within their city limits and plan for future growth and development beyond their present boundaries.

Displacement

Table 6.1-5 shows the number of residential and nonresidential structures within the 1,000-foot routes for each route alternative and option area. The nonresidential structures within each route and option are garages, barns, other accessory buildings, or commercial buildings. Twenty more residences are located within the Applicant Preferred Route compared to Route A.

Table 6.1-5. Residences and Nonresidential Structures Located Within Routes and Route Option Areas

Route/Option	Structures Within 1,000-Foot Routes and Substation Areas	
	Residences	Nonresidential Structures
Routes Alternatives		
Applicant Preferred	57	246
Route A*	37	98
Route Options		
Option 4	2	1
Option 5	3	3
Option 6	16	49

**Includes area with Option 7.*

Pipelines

Two Williams Brothers, one Amoco, and one Northern Natural Gas pipelines occur in the project area. These pipelines are a continuation of the pipelines located in the North Dakota to Alexandria Switching Station portion of the project. The Amoco pipeline runs in an east-west direction. The Williams Brothers and Northern Natural Gas pipelines run in a north south direction. The Amoco Liquid and Williams Brothers pipelines transport oil. The Northern Natural Gas pipeline transports gas (Appendix H).

Noise

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of 3 dBA is barely perceptible to average human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A ten dBA change in noise levels is perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Cumulative noise increases occur on a logarithmic scale. If two noise sources with the same noise output are added together, there is a 3 dBA increase in noise, which is barely discernible to the human ear. For example, if one noise source of 85 dBA is added to another noise source of 85 dBA, the resulting level would be 88 dBA. This should not be confused with a "doubling of noise" as described above. For cumulative increases resulting from sources of different magnitudes, the rule of thumb is that if there is a difference of greater than ten dBA between noise sources, there will be no additive effect (*i.e.*, only the louder source will be heard and the quieter source will not contribute to noise levels) or if one source is 85 dBA and this is added to another source which is 95 dBA, the resulting level of the two would be 95 dBA).. Therefore,

predicted noise levels associated with the transmission line are typically much lower than the ambient noise in the project area and will not increase the existing background noise levels in the project area. Table 5.1-6 provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 6.1-6. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Concert
110	Pneumatic chipper (powered by compressed air or hydraulics)
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Business office
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA (revised, 1999)

The Minnesota Pollution Control Agency (MPCA) has established standards for the regulation of noise levels. The land use activities associated with residential, commercial, and industrial land have been grouped together into Noise Area Classifications (NAC). (Minn. R. 7030.0050). Each NAC is then assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC. (Minn. R. 7030.0040). Table 5.1-7 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a 1-hour period; L_{50} is the dBA that may be exceeded 50 percent (30 minutes) of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent (6 minutes) of the time within an hour. Residences, which are typically considered sensitive to noise, are classified as NAC 1.

Table 6.1-7. MPCA Noise Limits by Noise Area Classification (dBA)

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

6.1.2 Potential Impacts

Potential impacts from the proposed project were quantified, where possible, within the assumed 150-foot ROW for each route and option. . This section includes a discussion of impacts associated with socioeconomic resources, land use and zoning, displacement, property values, pipelines, and noise. Quantities of potentially impacted resources, typically measured by the number of features or acreage affected within a ROW, were compared among the route alternatives and options to determine the range of effects to the resource.

Socioeconomics

The construction and operation of the transmission lines is expected to have minimal short-term influence on the local (county and municipal) economies. In terms of payroll earnings and construction expenditures, the economic benefit from the project would be small relative to the regional local economies of Alexandria and Sauk Centre. The construction, operation, and maintenance of the substations and transmission line are not anticipated to negatively impact socioeconomic resources in the study area.

Immediate short-term positive economic gains would likely result from activities associated with construction of the proposed project, although the construction and operation of the transmission line is expected to have limited influence on the local economy. The counties within the project area may see a small boost in economic benefit due to payroll earnings, employment opportunities, and construction expenditures. Long-term beneficial impacts from the project would include incremental increases in revenues from utility property taxes, which are based on the value of the facilities. Taxes would be paid based on compliance with all applicable Minnesota and county statutes and regulations. Additionally, landowners could receive compensation for the rights to build, operate, and maintain the transmission facilities within the easement area. However, these long-term benefits are anticipated to be minor, compared to the regional economy.

Local businesses such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance service providers may also benefit from the project's construction. Local businesses could likely see an increase in revenues from construction, and the number of workers hired from within and outside the project area may result in positive economic gains in the form of increased wages and spending, lodging, meals, and other consumer goods and services. Construction crews would likely require temporary housing, which may include apartment rentals, hotels, motels, or campgrounds. These types of housing are abundant in the Fargo, Alexandria, and St. Cloud areas.

Land Use and Zoning

The construction and operation of a transmission line can impact existing and planned land uses and local zoning through the conversion of existing land use to transmission line ROW. Within the route alternatives, the majority of land is used for agriculture or is zoned for agricultural use, therefore this land use type would be the most likely to be affected by the project. However,

these impacts are anticipated to be limited to pole locations, and the majority of the transmission line ROW could continue to be used for agricultural purposes.

Zoning within each route is illustrative of the type of land use that could be impacted by the ultimate 150-foot transmission line alignment. Quantitative data on specific alignments are provided in Table 6.1-8 for the Applicant Preferred Route, Route A, and the route options within the Alexandria to Sauk Centre area. The alignments associated with the Applicant Preferred Route considers ROW occupancy with Interstate 94. The ROW occupancy alignment proposes an alignment within 25 feet of the interstate ROW and the no ROW occupancy alignment proposes no ROW occupancy with Interstate 94.

Table 6.1-8. Route Right-of-Way Impact Evaluation for Land Use: Route Alternatives

Route	Acres						
	Agriculture	Residential	Commercial /Industrial	Municipal	Recreation	Special Ag.	Transitional
Applicant Preferred ROW Occupancy	322	117	46	0	66	0	0
Applicant Preferred No ROW Occupancy	213	77	31	0	44	0	0
Route A	482	104	15	0	41	40	0

The proposed routes shown in Table 6.1-8 primarily cross through agricultural and rural residential land; however, the Applicant Preferred Route also includes area on the fringe of Alexandria and Sauk Centre. The primary difference between the two routes is the amount of agricultural, commercial/industrial, recreation, and special agricultural land. The Applicant Preferred Route, within the corridor occupancy options, would affect approximately 30 acres more of commercial/industrial zoned land compared to Route A and approximately 25 additional acres of recreation land. Route A affects approximately 160 more acres of agricultural land, including 40 acres of land zoned for special agricultural uses compared to the Applicant Preferred Route.

Effects on planned land uses as identified in the future land use plans for each affect jurisdiction would vary depending on the route selected. The city of Alexandria has identified a planning area southwest of the intersection of Interstate 94 and Highway 29. The city of Sauk Centre has also planned for commercial growth at the Interstate 94 and U.S. Highway 71 interchange. Future annexation by these cities and planned uses in these areas could be affected by the Applicant Preferred Route.

Table 6.1-9. Route Option Evaluation for Land Use: Option Areas

Option	Acres						
	Agriculture	Residential	Commercial / Industrial	Municipal	Recreation	Special Ag.	Transitional
Option 4							
Route A	59	32	0	0	0	0	0
Option 4	67	10	0	0	14	0	0
Option 5							
Applicant Preferred ROW Occupancy	52	0	0	0	3	0	0
Applicant Preferred No ROW Occupancy*	34	0	0	0	2	0	0
Option 5	55	0	0	0	5	0	0
Option 6							
Applicant Preferred ROW Occupancy	114	13	28	0	13	0	0
Applicant Preferred No ROW Occupancy*	75	9	9	0	9	0	0
Option 6	220	8	1	0	1	0	0
Option 7							
Route A	59	0	0	0	0	0	0
Option 7	41	0	0	0	0	0	0

Land use impacts associated with the route options are shown in Table 6.1-9. Option 4 would impact less residential land, but additional recreation land. Within Option 5, only five additional acres would be impacted. Option 6 avoids recreation land along Interstate 94, but would impact nearly double the amount of agricultural land compared to the corridor occupancy alignments associated with the Applicant Preferred Route. Option 7 differs from Route A by reducing the amount of agricultural land impacted by approximately 18 acres.

Existing land uses in proximity to any of the routes are not expected to change as a result of construction and operation of the proposed transmission line. In agricultural areas, the majority of land underneath the transmission lines could still be used for agricultural purposes. However, an average of 55 square feet of land would be permanently impacted at each pole location.

Displacement

Displacement of residences and commercial or industrial properties can occur when the transmission line ROW cannot avoid such structures. In such a situation, the property and the structures on it are acquired, and the occupant(s) of the structures are relocated to a new residence or business location. However, no likely residential displacement locations within the proposed ROWs were identified, with the exception of a possible relocation required for Option 4. Nonresidential buildings are also located within the transmission line routes and these include commercial buildings and residential accessory structures.

Table 6.1-10 shows the number of residential and nonresidential structures within 500 feet of the proposed ROW centerline for each route. To the extent feasible, the proposed 345 kV transmission line can be designed by the Applicant so that all existing residences are located outside of the required ROW.

Table 6.1-10. Route Right-of-Way Impact Evaluation for Displacements: Route Alternatives

Alternative	Residences within Proximity of Alignment (Feet)				
	0-75	75-150	150-300	300-500	Total within 500
Applicant Preferred ROW Occupancy	0	12	13	16	41
Applicant Preferred No ROW Occupancy	0	13	12	18	43
Route A	0	8	13	13	34

Table 6.1-11 shows the number of residential and nonresidential structures within 500 feet of the proposed ROW centerline for each route option.

Table 6.1-11. Route Right-of-Way Impact Evaluation for Displacements: Option Alternatives

Alternative	Residences within Proximity of Alignment (Feet)				
	0-75	75-150	150-300	300-500	Total within 500
Option 4					
Route A	0	0	2	3	5
Option 4	1	1	0	0	2
Option 5					
Applicant Preferred ROW Occupancy	0	0	2	1	3
Applicant Preferred No ROW Occupancy	0	1	1	0	2
Option 5	0	0	0	3	3
Option 6					
Applicant Preferred ROW Occupancy	0	12	10	15	37
Applicant Preferred No ROW Occupancy	0	12	10	15	37
Option 6	0	3	5	8	16
Option 7					
Route A	0	2	2	0	4
Option 7	0	0	0	0	0

With the exception of Option 4 where one residence is located within 75 feet of the ROW centerline, no residences are located within 75 feet of the ROW for the route options.

Property Values

Concerns regarding potential effects to property values for parcels of land crossed by the alternative routes were voiced by members of the public during project scoping. A number of research studies have been conducted on the effect of HVTL and other energy facilities on residential properties. A literature review was conducted to determine if conclusive impact assessments can be made. These studies included appraiser studies, attitudinal studies, and statistical analyses. None of the studies reviewed during this research provided conclusive findings which could isolate the impacts of transmission lines on property values.

Property values for parcels of land crossed by or adjacent to the proposed transmission line are not anticipated to significantly change. Literature reviews indicate that although value losses up to 20 percent have been reported (EPRI, 2003), study results are highly dependent on methodology and location. Numerous studies have found that property values for parcels near transmission lines are more dependent on traditional assessment categories, such as location, house size, and amenities, rather than the presence of a transmission line. Impacts are the greatest for agricultural lands where the transmission lines interfere with cultivating paths and spraying practices, high-end vacation properties, and small homesteads. Loss of value for residential parcels results from concern about health and visual impacts. However, impacts typically diminish within 10 years of transmission line construction. Positive impacts to property values can occur when transmission line ROWs are allowed to be cultivated or developed into recreational areas (Cowger, 1996 and Wisconsin Public Service Commission, 2000).

Several of the studies reviewed indicated that property value losses have been experienced, but decreases in property values are typically minor and the amount of decrease is dependent on the unique circumstances of each property. A literature review and statistical analysis conducted in 2008 reviewed a number of studies conducted between 1984 and 2007 and evaluated the effect on property values from HVTL in Connecticut and Massachusetts (Voorvaart and Chalmers, 2008). The study concluded that there is no evidence of effects on residential real estate values due to either proximity or visibility of HVTL.

Pipelines

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

Conductive interference is a concern when a transmission line fault occurs in proximity to the pipeline, as it can cause AC currents to enter the pipeline at coating holidays (flaws in the coating) and produce a voltage gradient across the pipeline coating. Electric and magnetic effects

are also a concern during a fault because the phase current in at least one phase (conductor) of the high voltage AC transmission line is elevated.

Capacity effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. To prevent contact shock hazards, proper horizontal and vertical separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) must be maintained.

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

The Applicant Preferred Route and Route A would cross the two Williams Brothers pipelines and the Northern Natural Gas pipeline once each. The Amoco Pipeline would be crossed by the Applicant Preferred Route once, by Route A twice, and by Route Options 6 and 7 once (Appendix H).

Noise

Construction activities would generate noise that is short-term and intermittent. Construction activities would be limited to daytime hours classified by the MPCA as between 7 a.m. and 10 p.m. As such, the project would not have significant noise effects for the surrounding area.

Transmission lines produce noise under certain conditions. The level of noise depends on conductor conditions, voltage level, and weather conditions. Generally, activity-related noise levels during the operation and maintenance of transmission lines are minimal and do not exceed the MPCA Noise Limits outside of the right-of-way.

In foggy, damp, or rainy weather, transmission lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the conductors. During heavy rain the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, transmission lines will produce audible noise approximately equal to household background levels.

The proposed transmission lines were modeled using referenced noise values and with a 3dB reduction per doubling of distance to simulate divergence due to distance from a line source. Where possible, the model was executed as a worst-case scenario benchmark to ensure that noise was not under-predicted. Table 6.1-12 presents the L_5 and L_{50} predicted for proposed transmission lines for the project. The L_5 is a noise level that will not be exceeded more than five percent of the time. Using the L_5 for demonstrating compliance with the MPCA L_{10} standard is conservative because the noise level exceeded 10 percent of the time will be less than noise level exceeded five percent of the time.

Table 6.1-12. Calculated Audible Noise for the Operation of Proposed Single/Double Circuit Transmission Line Designs (Receptor 3.28 Feet above Ground)

Structure Type	Noise L_5 (Edge of Right-of-Way75 feet, Estimated Ambient + dBA increase)	Noise L_{50} (Edge of Right-of-Way, dBA)
Steel Mono-Pole 345 kV/345 kV Double Circuit	48.5	45.5

With the 75-foot set-back distance determined to be the buffer within which coronal noise may be audible, each of the proposed routes and options were analyzed to determine if any residential receptors were affected.

Residences residing within 1,000 feet of Applicant Preferred Route, Route A, Option 4, 5, 6, and 7 would fall within the NAC 1 category under Minn. Rules. As such, the L10 and L50 from the project must not exceed nighttime levels of 55 and 50 dBA at these residences, respectively. Since it is assumed that the noise levels generated by the project will be the same at night as those generated during the daytime, compliance with the nighttime levels (more restrictive) will also demonstrate compliance with the daytime noise standards due to greater noise sensitivity of humans at night.

Noise associated with the operation of the proposed 345 kV transmission line along the Applicant Preferred Route and Route A is not predicted to exceed the noise limits identified by the MPCA at any of the adjacent the residential receptors.

Noise associated with the operation of the proposed 345 kV transmission line along Option 4 is predicted to exceed the noise limits identified by the MPCA at one of the adjacent residential receptors because it is within the 75' ROW. Therefore; mitigation for noise at this receptor and for Option 4 will need to be analyzed.

Noise associated with the operation of the proposed 345 kV transmission line along the Options 5 and 6 are not predicted to exceed the noise limits identified by the MPCA at any of the adjacent residential receptors.

Noise associated with the operation of the proposed 345 kV transmission line along Option 7 is not predicted to exceed the noise limits identified by the MPCA at any of the adjacent the residential receptors.

6.1.3 Mitigation

Land Use

The Applicant could purchase ROW easements for private property crossed by the transmission line in accordance with state and federal land acquisition requirements. In addition, the transmission line alignment could be designed to avoid structures to the extent practical. No additional mitigative measures are necessary relative to land use.

Displacement

Landowners could be compensated for easements and parcel acquisitions for the project. As described, no residential displacements are anticipated, and nonresidential structure displacements are unlikely. If avoidance cannot be achieved, landowners could be relocated and compensated for all easements and parcel acquisitions.

Property Values

Based on the research conducted it is anticipated that there could be limited impacts on the values of residential properties adjacent to the transmission line. The compensation for easements would offer some mitigation for property value impacts for those properties directly affected by the transmission line ROW.

Pipelines

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

None of these mitigation methods are expected to require additional ROW. Reducing transmission impedance consists of adding stacked or parallel ground rods to the structure grounding system. This is done adjacent to the transmission structure, thus no additional transmission line ROW is required. Grounding a pipeline typically occurs within the existing pipeline through a de-coupler device to prevent DC cathodic protection current from flowing to the ground. Gradient control wires are typically copper conductors buried parallel to and adjacent to the pipeline (within 5 to 10 feet).

Ground mats consist of an 8-foot-square section of conductors buried underneath where pipeline personnel stand when operating a valve. Dead fronts consist of replacing the existing test sections with test sections that are non-conductive and require no additional land. Lastly, additional "coupon stations" are sometimes installed to monitor the pipeline to insure that mitigative measures are effective at preventing AC pipeline corrosion. These facilities are installed adjacent to the pipeline and use coupons that are exposed to the same environment as the pipeline and are monitored to determine if AC corrosion is occurring. This typically may not require additional ROW.

The Applicants could insure that computer modeling of AC interference effects is completed and that any required mitigation is designed and installed prior to energizing the transmission line. Based on past projects, the cost to complete computer modeling, mitigation design, and installation is low compared to the overall cost of the project. The Applicants have been meeting

and working with all known pipeline owners to ensure there is adequate separation between the proposed transmission line and pipelines.

Noise

Mitigation for the impacted receptor near Option 4 could entail moving the proposed alignment so that the residential receptor is greater than 75 feet away from the residence thereby reducing the amount of noise experienced below MPCA threshold. If this is not possible, improvements to the residence windows and doors to enhance external to internal noise rejection could lower noise levels so that corona noise may not be heard inside the home. Relocation of the residence would be another option to eliminate the noise impact issue.

6.2 PUBLIC HEALTH AND SAFETY

This section summarizes the potential impacts of the proposed transmission line and substations on health and safety, specifically electromagnetic fields (EMF), stray voltage, and health effects. EMF , as it relates to transmission lines, is addressed as two separate fields; electric fields and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line. The intensity of the magnetic field is related to the current flow through the conductors.

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Concerns related to health effects from EMF are also discussed in this section, including potential impacts to implantable medical devices (IMDs).

6.2.1 Affected Environment

The affected environment for public health and safety includes certain activities and facilities within the proposed routes and route options. These activities and facilities include design and construction of the project, farming operations, vehicle use, and metal buildings near power lines, public and emergency services, electromagnetic fields, stray voltage, and implantable medical devices.

Electromagnetic fields

The term EMF refers to electric and magnetic fields that arise from the electrical potential (voltage) and the movement of an electrical charge (current) associated with the transmission and use of electricity. Electric and magnetic fields are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. The frequency of transmission line EMF in the United States is 60 hertz and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 hertz). For the lower frequencies associated with power lines, the electric and magnetic fields are typically evaluated separately. The intensity of the electric field is related to the voltage of the line, while the intensity of the magnetic field is related to the current flow along the conductors.

Concerns about health effects of EMF from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. Initial epidemiological studies done in the late 1970s showed a weak correlation between potential magnetic field exposure (such as wiring codes or distance from roads) and increased rates of childhood leukemia. (Wertheimer et. al, 1979). More recent studies that used direct measurements of magnetic field exposure show either a very weak, or no statistical correlation with adverse health affects, e.g., Savitz, et. al. 1988; and toxicological and laboratory studies have not identified a biological mechanism between ELF-EMF and cancer or other adverse health effects. The issue of health effects related to ELF EMF is discussed in more detail below.

While there are numerous internet sites devoted to EMF dangers (whether from power lines, cell phones, or radio frequency signals), the vast majority of experts believe that EMF from power lines does not cause leukemia or any other health problems. In part, these experts argue the physical impossibility of any health effect due to such low-frequency, low-energy magnetic fields.

Natural and human-made electromagnetic fields are, in fact, present everywhere in the environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter (V/m) to well over several kilovolts per meter (kV/m) produced by the build-up of electric charges in thunderstorms. The Earth itself has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). In addition to the presence of the earth's steady state electric field, an average home experiences additional magnetic fields of 0.5 mG to 4 mG which arise from the general wiring and appliances located in a typical home (National Cancer Institute, 2009).

Electric fields

Electric fields are created by voltage or the difference in the electric charge between two points, and are measured in V/m or kV/m. Higher voltage produces stronger electric fields. The intensity of the electric field decreases significantly with increasing distance from the source and electric fields are easily shielded or weakened by objects such as trees, buildings, clothing, and skin.

The available data for exposure to static electric fields suggest that the only negative human health effects are the direct perception of body hair movement and small shocks, similar to the shock received by the induced friction from walking on a carpet and touching a doorknob. On the whole, scientific evidence indicates that chronic exposure to electric fields at or below levels traditionally established for safety does not cause adverse health effects. Safety concerns related to electric fields are sufficiently addressed by adherence to the NESC.

There are currently no federal guidelines on the strength of electrical fields beneath high voltage transmission lines. However, a few states, agencies, and organizations have established regulations or guidelines with regard to transmission line electric fields.

However, around six states have established their own regulations or guidelines with regard to transmission line electric fields. See Table 6.2-1 below.

Table 6.2-1. Transmission Line Electric Field State Guidelines

State	Electrical Fields	
	On ROW	Edge of ROW
Florida	8 kV/m[a]	2 kV/m
Minnesota	8 kV/m	
Montana	7 kV/m	1 kV/m[d]
New Jersey		3 kV/m
New York	11.8 kV/m 11 kV/m[e] 7 kV/m[c]	1.6 kV/m
Oregon	9 kV/m	

[a] *For lines of 69-230 kV*
[b] *For 500 kV line*
[c] *Maximum for highway crossings*
[d] *May be waived by the landowner*
[e] *Maximum for private road crossings*

The 8 kV/m guideline used by the Commission is designed to prevent injury from shocks when touching large objects such as a bus or agricultural equipment parked under high-voltage transmission lines of 345 kV or greater. A route permit for a high-voltage transmission line typically states the line shall be designed, constructed, and operated in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m. However, organizations have established exposure guidelines for general public and occupational magnetic field expos

Table 6.2-2. Electric Field Exposure Guidelines

Organization	Electric Field Exposure Guidelines (kV/m)	
	General Public	Occupational
ICNIRP (2009)	4.2	8.3
IEEE (2002)	5	20
ACGIH (2009)	_	25

ICNIRP – International Commission on Non-Ionizing Radiation Protection
IEEE – Institute of Electrical Engineers and Electronic Engineers
ACGIH – American Conference of Governmental Industrial Hygienists

Magnetic Fields

Magnetic fields are created by electric current or flow (measured in amperes). Higher currents produce stronger magnetic fields. However, unlike electric fields, magnetic fields are not easily shielded and pass through most structures or objects. Consequently health concerns regarding EMF have focused more closely on magnetic fields than electric fields.

People encounter magnetic fields from everyday things such as radar and microwave towers, television and computer screens, motors, fluorescent lights, microwave ovens, cell phones,

electric blankets, house wiring and hundreds of other common electrical devices. As with electric fields, magnetic fields decrease in strength with increased distance from the source. The strength of both the electric and magnetic fields from transmission lines is inversely proportional to the square of the distance from the source conductors (i.e., the field strength decreases more quickly the further one is from the source). Magnetic fields also vary in intensity depending on the type of structure and the amount of current flowing through the transmission line in a given area.

There are currently no federal guidelines on the strength of electrical fields beneath high voltage transmission lines. However, a few states have established their own regulations or guidelines with regard to transmission line electric fields See Table 6.2-3 below.

Table 6.2-3. States with their Own Magnetic Field Regulations

State	Magnetic Field at Edge of ROW
Florida	150 mG[a] (max load) 200 mG[b] (max load) 250 mG[c] (max load)
New York	250 mG[c] (max load)

a For lines of 69-230 kV
b For 500 kV lines
c For 500 kV lines in certain existing ROW

Table 6.2-4 below outlines Magnetic Field Exposure Guidelines established by the International Commission on Non-Ionizing Radiation Protection (INIRP), the Institute of Electrical Engineers and Electronic Engineers (IEEE) and the American Conference of Governmental Industrial Hygienists (ACGIH) .

Table 6.2-4. Magnetic Field Exposure Guidelines

Organization	Magnetic Field Exposure Guidelines (mG)	
	General Public	Occupational
ICNIRP (2009)	833	4,200
IEEE (2002)	9040	27,100
ACGIH (2009)	_	10,000

Stray Voltage

Stray voltage is a condition that can occur on the electric service entrances to structures from distribution lines—not transmission lines. More precisely, stray voltage exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors. By code, electrical systems, including farm systems and utility distribution systems, must be grounded to the earth to ensure continuous safety and reliability. Where the electrical system is grounded, some current inevitably flows through the ground and a low level of voltage called neutral-to-earth voltage (NEV) develops at these locations. When NEV is measured between

two objects that may be simultaneously contacted by an animal, it is frequently referred to as stray voltage. Stray voltage is not electrocution, ground current, EMF, or earth current. Transmission lines have been shown to contribute to stray voltage when the electric distribution system directly serving a farm or wiring of a farm was directly under and parallel to the transmission line. These circumstances are considered and generally avoided during installation of transmission lines, thereby mitigating the contribution of stray voltage from a transmission line project.

Health Effects

The study of cancer in relation to ELF EMF has been a topic of study since the late 1970s. Since that time there have been several epidemiological studies that have explored the possible association of not only cancer risks, but other potential human maladies (brain tumors, leukemia, breast cancer, and mental health issues). Studies have focused on both occupational exposures for individuals working in electrical industries and public exposures for children and adults living and working around common EMF sources (in-home wiring, transmission lines, home, and office appliances/equipment). The results of the various studies conducted over the last three decades, specifically those regarding the relationship between EMF and childhood leukemia and other cancer risks, have been mixed; some have found an association while others have not.

Where there is association suggested in epidemiological studies, it is usually very near the statistical threshold of significance. However, when these studies are repeated in a laboratory, the results have not reproduced or identified a biological mechanism to support a link between childhood leukemia and magnetic fields. The replication of field results in a laboratory setting is a basic test of scientific validity. Researchers continue to look at magnetic fields until more certain conclusion can be reached.

The World Health Organization (WHO), in 1996, launched a large multidisciplinary research effort to address growing public concerns over the possible health effects from exposure to EMF. Based on in-depth review of scientific literature the WHO concluded that, "…current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research." Leukemia is the most common childhood cancer worldwide for children ages zero to 14, with approximately 2,600 cases diagnosed in the United States annually.

The cause of childhood leukemia is not known. Many suspected risk factors have been studied and evaluated, but ultimately most children with leukemia do not have any risk factors, and as stated above, the cause of their cancer is not known at this time. In the case of high-voltage power lines as a suspected risk factor, the WHO indicates that few children have time-averaged exposures to residential 60 Hz magnetic fields in excess of the levels suspected to be associated with an increased incidence of childhood leukemia. Approximately one to four percent have mean exposures above 3 mG and only one to two percent have median exposures in excess of 4 mG. If there are any health risks, such as childhood leukemia, associated with living near power lines, then it is clear those risks are very small, otherwise we should be witnessing an observable epidemic of childhood cancers. However, there is little, if any evidence of such an epidemic of childhood cancer.

Implantable medical devices (IMDs) are those that are intended to be completely or partially introduced into the human body, indefinitely. Common IMDs include: pacemakers, implantable cardioverter defibrillators (ICDs), neurostimulators, cochlear implants and insulin pumps. Interference with the operation of pacemakers and implantable cardioverters/defibrillators is a potential impact of electric fields. Interference with IMDs can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction. Modern bipolar devices are much less susceptible to interactions with electric fields.

6.2.2 Potential Impacts

Electric Fields

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, which is in close proximity to the transmission line. HVTLs can induce a voltage on such objects and therefore make it possible for current to flow as the object is discharged. The voltage buildup is dependent on many factors, including the weather; object shape, size, orientation, and capacitance; object to ground resistance; and location along the ROW. If these objects are insulated or semi-insulated from the ground and a person touches them, a small current could pass through the person's body to the ground. This might 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. It is important to note that underground transmission lines still generate electric fields that are detectable above the ground surface.

The main concern with induced voltage on an object is the discharge through the person to ground if contact is made with the object. The best method to avoid these discharges is to avoid parking equipment directly under the transmission line. To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (ma). Based on Applicants' 115 kilovolts (kV), 230 kV, and 345 kV transmission line operating experience, the discharge from any large mobile object—such as a bus, truck, or farm machinery— parked under or adjacent to the transmission line are less than 5 ma and may unlikely reach levels considered an annoyance. Applicants could also assure that any fixed object, such as a fence or other large permanent conductive object in close proximity to or parallel to the transmission line, could be grounded so any discharge may be less than the 5 ma NESC limit.

Similarly, the Commission's standard of maximum electric field limit of 8 kV/m measured one meter above ground was designed to prevent serious hazard from shocks when touching large objects placed under AC transmission lines of 500 kV or greater. The proposed facilities are intended to comply with the NESC and Commission standards.

Table 6.2-5 provides electric fields at the maximum conductor voltage for the type of transmission line facilities proposed. Electric fields were calculated using ENVIRO, a software program licensed by the EPRI. The calculated electric field assumed the maximum operating voltage of 362 kV, which is 105 percent of the nominal voltage for the transmission line. For any specific design, the set of phase conductors' height above ground has a marked influence on the

maximum electric field. The phasing arrangement is of particular importance for the maximum field for a double circuit configuration (two circuits on a single structure).

Table 6.2-5. Predicted Electrical Fields (kV/m) for Proposed Double Circuit 345 kV Transmission Line Designs (3.28 Feet above Ground)

Structure Type	Nominal Voltage (kV)	Distance to Proposed Centerline											
		-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'
Single Pole Davit Arm 345kV Single Circuit Delta Config	362	0.05	0.12	0.65	1.15	2.02	2.56	2.32	4.34	2.28	0.99	0.52	0.11
Single Pole Davit Arm 345kV Single Circuit Vertical Config	362	0.08	0.16	0.21	0.31	1.50	4.27	3.81	1.22	0.19	0.14	0.19	0.12
Single Pole Davit Arm 345kV/345kV Double Circuit with One Circuit In Service	362	0.04	0.08	0.11	0.05	0.22	1.16	3.76	4.30	1.58	0.40	0.18	0.12
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	362	0.02	0.05	0.15	0.42	1.41	3.46	2.48	3.46	1.41	0.42	0.15	0.05

The predicted electric field strengths range from 2.32 kV/m to 3.76 kV/m at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 5.2-4 and the Commission's maximum safety limit of 8 kV/m.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge could drain off when the charger unit is connected to the fence. When the charger is disconnected, either for maintenance or when the fence is being built, shocks may result.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines could be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields, and grazing lands specified by the NESC.

Buildings are permitted near transmission lines, but are generally prohibited within the ROW itself because a structure under a transmission line may interfere with safe operation. For example, a fire in a building located in the ROW could damage a transmission line.

Magnetic Fields

Table 6.2-5 provides calculated magnetic fields for each structure and conductor configuration proposed for the project. Magnetic fields were calculated for each section of the project and under two system conditions; the expected peak and average current flows as projected for the

year 2011, under normal system intact conditions. Current is given in amps. The peak magnetic field values are calculated at a point directly under the transmission line and where the conductor is closest to the ground. The same method is used to calculate the magnetic field at varying distances from the alignment of the structure. The magnetic field profile data show that magnetic field levels decrease rapidly (inverse square of the distance from source) from the alignment.

Because the magnetic field produced by the transmission line is dependent on the current flowing on its conductors, the actual magnetic field when the project is in service is typically less than that shown in the table. This is because the calculations in the tables represent the magnetic field with current flow at expected normal system peak conditions. Actual current flow on the transmission line could vary as magnetic field changes throughout the day and could be less than peak levels during most hours of the year.

Table 6.2-5. Calculated Magnetic Fields (milligauss) for proposed double circuit 345 kV Transmission Line Designs (3.28 feet above ground)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline												
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	Peak	264	0.79	1.67	5.62	8.70	14.36	23.45	31.89	29.76	17.92	10.19	6.26	1.65	0.72
	Average	158	0.47	1.00	3.36	5.21	8.60	14.03	19.08	17.81	10.73	6.10	3.75	0.99	0.43
Single Pole Davit Arm 345kV Single Circuit Vertical Config	Peak	264	0.86	1.97	7.12	11.10	18.17	27.45	25.55	16.04	9.86	6.41	4.42	1.48	0.71
	Average	158	0.52	1.18	4.26	6.65	10.87	16.43	15.29	9.60	5.90	3.84	2.64	0.88	0.42
Single Pole Davit Arm 345kV/345 kV Double Circuit with One Circuit In Service	Peak	264	0.71	1.48	4.43	6.43	9.89	16.09	25.62	27.50	18.18	11.10	7.11	1.97	0.86
	Average	158	0.43	0.89	2.65	3.85	5.92	9.63	15.33	16.46	10.88	6.64	4.25	1.18	0.52
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	Peak	264	0.19	0.58	3.32	6.08	11.96	22.90	30.03	23.06	12.10	6.17	3.39	0.59	0.19
	Average	158	0.11	0.35	1.99	3.64	7.16	13.71	17.97	13.80	7.24	3.70	2.03	0.35	0.12

Predicted magnetic field strengths range from 15.29 to 31.89 milligauss at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 6.2-2.

Although the line would be built with double circuit capable poles, only a single circuit would be installed for this project. Electric and magnetic fields are lower for a double circuit configuration than for a single circuit configuration. The lower predicted values for a double circuit configuration results from a cancellation effect when two circuits on a single structure are designed to operate under opposite phases. Based on the proposed design and operation of the project, no impacts are anticipated due to EMF.

Stray Voltage

The primary concern with stray voltage has been its potential effect on farm animals that are confined in areas where electrical distribution systems supply the farm. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Electrical current flowing between the neutral wire and ground is a normal part of electrical systems. Stray voltage problems are most often the result of the system not operating properly. This abnormal condition leading to stray voltage can be caused by poor grounding conditions, inadequate connections, lightening strikes, or undersized neutral conductors. Issues with stray voltage can also arise in circumstances where transmission lines are directly over or parallel to the electric distribution system serving the farm. Stray voltage can cause impacts to dairy farming operations and milk production. Issues are typically related to the distribution and service lines directly serving a farm or wiring on a farm. Issues with stray voltage can arise in circumstances where transmission lines are directly over or parallel to the electric distribution system serving the farm.

Health Effects

Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/ defibrillators, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices (Wisconsin PSC, 2009).

Older unipolar designs are more susceptible to electric field interference. Research completed by Toivoen et al. (1991) indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types does exceed levels that Toivoen et al. has indicated may produce interference. However, a recent paper (Scholten et al., 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

There are not expected to be any permanent impacts on implantable medical devices as a result of the project.

6.2.3 Mitigation

Electromagnetic Fields

There are no anticipated impacts attributed to EMF from the project, therefore, mitigation should not be needed. However, three primary methods to reduce EMF exposure for the project are explained below.

Magnetic field exposure is directly related to distance from the transmission line, therefore, as indicated in the route permit application, the applicants have selected route options and designs in part to avoid residences to the greatest possible extent. Also, the proposed ROW and the structures can be designed to help minimize EMF exposure.

The configuration and distance between transmission line phases has an impact on EMF exposure. The amount of EMF exposure is reduced when the phases are compacted. The applicants could consider compacted structure designs where feasible.

Phase cancellation significantly reduces EMF from transmission lines. For the double-circuit lines, rearranging phase conductors may help to reduce magnetic field strength. The applicants could consider these options during the detailed project design phase.

Stray Voltage

Mitigation of potential stray voltage impacts could include that all safety requirements are met during the construction and operation of the project. Appropriate measures could be taken to prevent stray voltage problems when the transmission lines proposed in this project parallel or cross distribution lines. Where possible, such crossings or parallel alignments could be avoided.

Health Effects

There are not expected to be any anticipated health effects from the project, including implantable medical devices, therefore, mitigation should not be needed.

6.3 RECREATION AND AESTHETIC RESOURCES

This section discusses recreation and aesthetics resources in the project area between Alexandria and Sauk Centre and the potential impacts on these resources. Aesthetic resources are the various elements of the landscape that contribute to the visual character of a place. The visual context of a setting is related to both the natural and built environment and transmission lines alter this context. Recreational resources in the project area from Alexandria to Sauk Centre include: Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), lakes, boat launches, local and regional trails, a golf course and other recreational uses.

6.3.1 Affected Environment

Recreation Land

Recreational uses occurring within one mile or adjacent to the Applicant Preferred Route include county trails and the Lake Wobegon Trail, and other non-private sensitive management areas or

areas generally hosting various types of conservation such as existing federal WPAs and state WMAs. Recreational uses occurring within one mile or adjacent to Route A include local and regional trails, the Lake Wobegon Trail, federal WPAs and state WMAs, a boat launch, and golf course. Visitors of these various recreational use areas may view the transmission line. There are no state parks or forests or SNAs within one mile of the routes. Regional trails in the project area include the Central Lakes Trail and the Lake Wobegon Trail. The Central Lakes Trail (CLT) is a 55-mile paved trail between Fergus Falls and Osakis. The Lake Wobegon Trail is a 46-mile long, regional trail that extends from the Central Lakes Trail in Osakis to St. Joseph. The trails generally parallel Interstate 94 to the north.

Lands generally grouped as recreational use areas, which would otherwise include local parks and open space, occur within the counties and incorporated communities affected by the proposed routes.

WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. State WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses.

Table 6.3-1. Recreational Land Use Impact Evaluation for Routes

Route/Option	Parks/Open Space/Recreation within proposed Route (Acres)
Route Alternatives	
Applicant Preferred Route	572
Route A*	258
Route Options	
Option 4 Alternatives	
Route A	0
Option 4	95
Option 5 Alternatives	
Applicant Preferred Route ROW Occupancy	31
Applicant Preferred Route No ROW Occupancy	31
Option 5	0
Option 6 Alternatives	
Applicant Preferred Route ROW Occupancy	218
Applicant Preferred Route No ROW Occupancy	218
Option 6	0

**Includes area within Option 7.*

Trails

The Option 5 alternative route to the Applicant Preferred Route parallels County Road 51 and the Stearns County Trail that connects the Central Lakes Trail in Osakis and the Lake Wobegon Trail Sauk Centre.

Option 6 includes a north/south connector between the Applicant Preferred Route and Route A is within one mile of the Stearns County Trail that connects the Central Lakes Trail in Osakis and the Lake Wobegon Trail Sauk Centre. Refer to Appendix H for maps of recreational resources.

Scenic Byways

One scenic byway is located in the vicinity of the Applicant Preferred Route and Route A. The Glacial Ridge Trail designated scenic byway occurs within one mile of the Applicant Preferred Route and Route A near Alexandria and Sauk Centre. The Glacial Ridge Trail scenic byway includes various state and county highways that make up a 245-mile loop meandering south from both Alexandria and Sauk Centre.

Aesthetics

The central portion of the project area travels between Alexandria and Sauk Centre. The topography in the project area is flat to rolling terrain but there are fewer lakes in the project area than the Fargo to Alexandria portion of the project. The regional landscape is characterized by drumlins and rolling plains with row crops, pasture, and woodland. Land uses associated with the routes are dominated by agricultural uses, characterizing the regional setting as mostly rural around dispersed population centers.

Open space, recreational areas, and other non-private sensitive management areas or areas generally hosting various types of conservation provide for a variety of viewing areas along the routes. Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the project, or would otherwise be visually exposed to the project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

Residential uses occurring within and along the Applicant Preferred Route include dispersed rural residential uses and residential uses occurring within or near incorporated communities. Residences having an unobstructed line of sight of the proposed 345 kV electrical transmission line would view the line. The distance between these residences and the line would also dictate the field of view, for example, a foreground or background view. The Applicant Preferred Route parallels existing transportation and utility rights-of-way. Generally, the Applicant Preferred Route is located in a built environment. Motorists along any roadways of which the Applicant Preferred Route parallels would view the transmission line. Although traffic volumes are typically highest when associated with major roads such as Interstate 94, U.S. highways, and state highways, motorist views may be considered more intermittent in that these roadways typically do not support local traffic. Local secondary roads of which the Applicant Preferred Route

parallels generally support motorists who use these roads more regularly or repeatedly. Additionally, while the interstate corridor itself is a pre-disturbed right-of-way that is regularly maintained, Mn/DOT has obtained scenic easements at various locations along Interstate 94. Route A does not follow major existing infrastructure and is generally along property lines or local roadways.

6.3.2 Potential Impacts

This section presents the potential impacts the project could have on recreation resources and aesthetics. Both routes would impact recreational resources similarly. There are no federal, state, or county parks or Wild and Scenic River Districts in the proposed routes. The number of trail crossings by each route was calculated. Historical markers, wayside rest areas, and golf courses within each route and ROW were identified. Scenic byways within one mile of the proposed routes and any byway crossings were identified. WPAs, WMAs, and scenic byways were analyzed to determine if they were present within one mile proposed routes. Impacts to WPAs and WMAs within the proposed route (typically 1,000') and ROW (150') is presented in Section 6.8 Natural Land Resources.

Recreation Land

Twelve WPAs, five WMAs, and one scenic byway are within one mile of the Applicant Preferred Route from Alexandria to Sauk Centre. The Lynx National Golf Course is located in the Route A ROW, east of State Highway 71 but it would not impact any greens or tees. Eight WPAs, six WMAs, one scenic byway are within one mile of Route A between Alexandria and Sauk Centre. Table 6.3-1 and Table 6.3-2 show the amount of recreational land use, according to zoning data, that would be impacted by the route alternatives and the route options.

Table 6.3-2. Recreational Land Use Within Each Route and Route Option Alternative ROW

Route/Option	Parks/Open Space/Recreation within proposed ROW (acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	66
Applicant Preferred No ROW Occupancy	67
Route A	41
Route Options	
Option 4 Alternatives	
Route A	0
Option 4	14
Option 5 Alternatives	
Applicant Preferred Route ROW Occupancy	3
Applicant Preferred Route No ROW Occupancy	3
Option 5	5
Option 6 Alternatives	
Applicant Preferred Route ROW Occupancy	13
Applicant Preferred Route No ROW Occupancy	13
Option 6	1
Option 7 Alternatives	
Route A	0
Option 7	0

The Applicant Preferred Route is located within one mile of more WPAs and WMAs than Route A. Route A impacts one recreational resource, the Lynx National Golf Course, while the Applicant Preferred Route would not impact any additional recreational resources.

Trails

The Applicant Preferred Route has greater impacts on local and regional trails than Route A which only impacts two local trails and has no impacts on regional trails. The Applicant Preferred Route not only crosses the Lake Wobegon regional trail but also parallels it which would establish permanent visual impacts to the trail. The Route Option 5 would create additional impacts on the Lake Wobegon Trail by paralleling and crossing the trail. Refer to Table 6.3-3 below for a summary of trail crossings between Alexandria and Sauk Centre.

Route A crosses several local snowmobile and multi-use non-motorized trails. Route A crosses the Douglas Area Trails Association Trail where it travels south from Interstate 94 along County Road 23 and a north/south oriented Stearns County Trail that travels south from Osakis along the Pope County Border. West of Sauk Centre, where the Lake Wobegon Trail travels along the east side of County Road 51, it is located within the proposed ROW for Option 5. The alignment crosses this trail where it turns south from the Preferred Alternative.

The Applicant Preferred Route crosses multiple local snowmobile and multi-use non-motorized trails. These trails are often associated with existing local roadways and provide access along roadway ROWs. The Applicant Preferred Route crosses a north/south oriented segment of the Douglas Area Trails Association Trail once where it travels south from Interstate 94 along County Road 23 and twice where it parallels the westbound travel lanes of Interstate 94 for a short distance east of Alexandria. The route also crosses a north/south oriented Stearns County Trail that travels south from Osakis. In addition to the local and county trails, the Applicant Preferred Route impacts a major regional trail. Approximately three miles of the Lake Wobegon Trail west of Sauk Centre is located within the proposed ROW for the Applicant Preferred Route. Approximately two miles of the trail is located within the proposed ROW for the Applicant Preferred Route on the east side of Sauk Centre. The Applicant Preferred Route crosses the Lake Wobegon trail twice on the west side of Sauk Centre and twice on the east side of Sauk Centre. Refer to Table 6.3-3 below for the number of crossings by route or option.

The Burgen Lake wayside rest area/Red River Ox Cart Trails historical marker is located in the Applicant Preferred Route along the westbound travel lanes of Interstate 94. Refer to Appendix H for maps of recreational resources.

Table 6.3-3. Trail Impact Evaluation

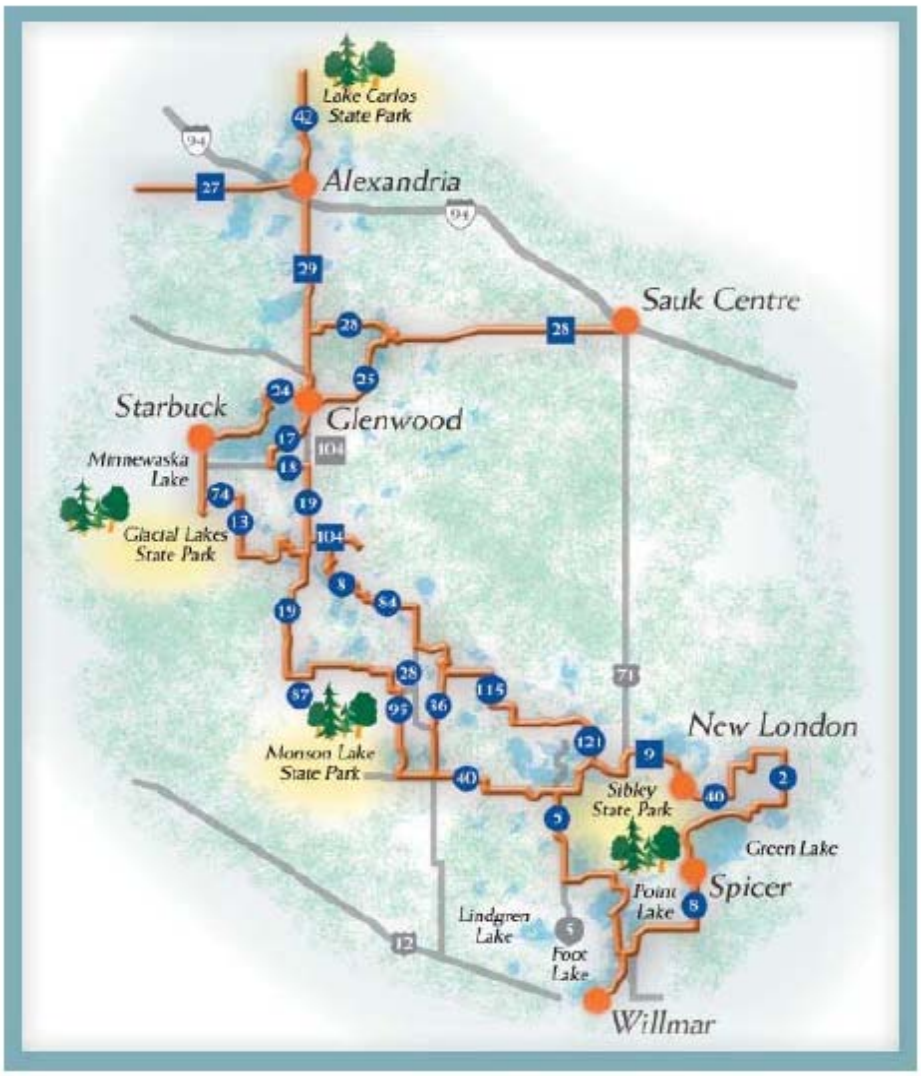
Routes and Options Affected	Trail Crossings		
	Douglas Area Trails Association Trail System	Stearns County Trail	Lake Wobegon Trail
Applicant Preferred Route	1	3	4
Route A	1	1	-
Option 5	-	-	1

Note: If no trail crossings for a route or option then it is excluded from the table.
Source: Billig, Jim. Central and Northwest Minnesota All-Outdoors Atlas. 2007.

Scenic Byways

The Glacial Ridge Trail scenic byway includes various state and county highways that make up a 245-mile loop meandering south from both Alexandria and Sauk Centre. The Glacial Ridge Trail designated scenic byway occurs within one mile of the Applicant Preferred Route and Route A near Alexandria and also Sauk Centre. The Alexandria to Sauk Centre portion of the project begins south of Alexandria at State Highway 27/29 which is part of the Glacial Ridge Trail Scenic Byway. Impacts to crossing this byway are discussed in Section 5.3.2. In this area none of the routes or options that parallel the byway and only Route A crosses the Glacial Ridge Trail Byway where it travels along County Road 28 southwest of Sauk Centre.

Diagram 6-1. Glacial Ridge Trail Byway



http://minnesotascenicbyways.com/glacialRidgeTrail.html

Visual Impacts and Aesthetics

The project extends diagonally from Alexandria to Sauk Centre. Similarly, Interstate 94 runs diagonally in a southeast to northwest between Alexandria to Sauk Centre. Throughout the route development process, Applicants have sought to identify areas to share rights-of-way with existing infrastructure, including roads, railroads, and existing transmission corridors. The proposed transmission line will likely affect visual resources within close proximity of the line and the physical characteristics of the project elements. The proposed line will be constructed primarily on single-pole, double circuit capable, self-weathering or galvanized steel structures.

Diagram 6-2. Representative 345 kV Double Circuit Single Pole Structure (Self-Weathering)

Both the routes and the route options require corner structures needed for right-angle turns in the line. Where angle structures are required at 90 degree turns in the line the linear nature of the facility will be broken and this interruption will make a greater visual impact than tangent structures.

In general, structures would have drilled pier concrete foundations (Diagram 5-56-3). Drilled pier foundations may vary from 6 to 9 feet in diameter and 25 or more feet deep, depending on soil conditions.

Diagram 6-3 Pier Foundation

Visual resources would be impacted by the introduction of the proposed 345 kV transmission line into the regional landscape. The transmission line would introduce new vertical forms or lines in areas where it would not otherwise parallel an existing transmission line. Since the area is largely rural, the proposed 345 kV line may introduce color contrasts during some lighting conditions or seasons. In addition to the proposed single pole steel structures, establishment of the required right of-way may alter color and textural contrasts as a result of vegetation removal. Vegetative tree species and some shrub species will be permanently removed within the right-of-way. The vegetation clearing necessary for construction and operation may create a dramatic change in the ROW cover in some areas.

In flat or rolling terrain, common in the area traversed by the routes, structures can be visible at distances greater than a mile. In the context of agricultural lands the pole structures would be visible from distances of up to two miles. The average height of 130-175 feet makes the new facility visible in the local communities and generally in the landscape. Transmission lines are likely to be seen only at distances up to three quarters of a mile at the most. The greatest visual impact would be in the interstate viewshed and agricultural landscape.

Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the project, or would otherwise be visually exposed to the project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

In the Alexandria to Sauk Center portion of the project, the routes impact aesthetics similarly. Sensitive viewpoints along each route would be similar. Route A and the options, however, parallel property lines and secondary roads, and in some locations would extend cross-country along no specific linear feature, whereas the Applicant Preferred Route parallels a pre-disturbed major transportation corridor for most of its length. Although the proposed 345 kV transmission line will introduce a new vertical form, line, color, and contrast in some areas, the proposed routes attempt to maximize the use of existing, pre-disturbed rights-of-way and minimize the proximity to existing residences to the greatest extent practicable. Placing transmission lines along existing infrastructure is intended to minimize the introduction of new

elements into undisturbed landscapes or homogeneous landscapes. Sensitive viewpoints along the Route Options and the potential for impact to visual resources as it relates to these viewpoints would be similar to those described above for the Applicant Preferred Route and Route A.

Residences within 500 feet of the alignments and within the proposed 150 foot ROW are presented in Table 6.3-4 below.

Table 6.3-4. Aesthetic Impact Evaluation for Route Alternatives and Route Option Alternatives

Route/Option	Homes	
	Within 500' of Alignment	Within 150' of Alignment
Route Alternatives		
Applicant Preferred ROW Occupancy	41	0
Applicant Preferred No ROW Occupancy	43	0
Route A	34	0
Route Options		
Option 4 Alternatives		
Route A	5	0
Option 4	2	1
Option 5 Alternatives		
Applicant Preferred ROW Occupancy	3	0
Applicant Preferred No ROW Occupancy	2	0
Option 5	3	0
Option 6 Alternatives		
Applicant Preferred ROW Occupancy	37	0
Applicant Preferred No ROW Occupancy	37	0
Option 6	16	0
Option 7 Alternatives		
Route A	4	0
Option 7	0	0

There are more homes within 500 feet of the Applicant Preferred Route than Route A which suggests a greater number of homes would directly view the line. There are 41 homes within 500 feet of the Applicant Preferred ROW Occupancy alignment and 43 homes within 500 feet of the Applicant Preferred No ROW Occupancy alignment whereas only 34 homes are located within 500 feet of the Route A alignment.

Route Option 5 would have the same impacts to homes within 500 feet of the Applicant Preferred ROW Occupancy alignment whereas the Applicant Preferred No ROW Occupancy alignment would impact one less home than Option 5 or the ROW Occupancy alignment.

Route Option 6 would reduce impacts to 21 fewer homes within 500 feet of the Applicant Preferred Route.

Option 4 would reduce impacts by three fewer homes within 500 feet of the route than Route A but would be the only ROW to include a home. Option 7 would reduce the impacts to four fewer homes within 500 feet than Route A.

Both routes begin at the Glacial Ridge Trail Byway where it travels south from Alexandria along County Road 29. Only Route A physically crosses the Glacial Ridge Trail Byway a second time where it travels along County Road 28 southwest of Sauk Centre, but generally, Route A has fewer overall impacts to homes but one additional impact to a scenic byway.

6.3.3 Mitigation

Based on a viewer's response and sensitivity, the presence of transmission lines can detract from the visual attractions of an area. Wherever possible, the proposed transmission lines could be routed alongside existing power lines and section lines, as well as within road, rail, and utility ROWs, to minimize any adverse impacts.

The transmission line could contrast with surrounding land uses, therefore landowners could be consulted to identify any concerns related to the project and visual aesthetics.

Generally, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Mitigation measures may not vary between alternative routes. Potential Mitigation measures could include the following.

- The placement of structures could allow the maximum feasible distance between residences within the limits of the structure design.
- Final structure locations, ROW, and any disturbed areas could be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Consideration could be made to preserve the natural landscape; construction and operation could be conducted to prevent unnecessary destruction, scarring, or defacing of the adjacent natural setting in the vicinity of the project.
- Undergrounding the transmission line.
- To the extent possible, transmission lines could parallel existing transmission lines and existing ROWs without violating sound engineering principles or system reliability criteria.
- Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design.
- Along existing roadways, transmission line alignments could be placed at locations with the fewest impacts to existing ROW.
- Visual screening with vegetation could be considered in the foreground where the route parallels scenic byways; but due to the height of the structure and the transmission lines they may still be visible in the background.

6.4 TRANSPORTATION

This section discusses potential impacts to and mitigation for local roadways and highways in the area of the project. Paralleling roadways reduces the need for additional transmission line ROW. Under the routes evaluated for this project, transmission lines may parallel and cross roads including township roads, county roads, county highways, state highways, and one interstate. Impacts can be anticipated when the transmission line crosses over a roadway, runs parallel to a roadway in close proximity such that roadway safety and maintenance activities are compromised, or when local or state government expands existing roadways and utility poles require relocation.

6.4.1 Affected Environment

Each of the route alternatives pass through a roadway network consisting of various interstate, state, county, city and other local roadways (HG). Many of the roadways in the area are low volume roadways that primarily serve farm to market functions. The counties of Douglas, Pope, Todd, and Stearns have responsibility for the operation and maintenance of their respective systems of county roadways. These roadways include county state-aid highways and county roads. Mn/DOT has responsibility for planning and funding roadway improvements on interstate highways, U.S. Highways, and state trunk highways.

Roadways

The Applicant Preferred Route primarily follows Interstate 94, though other ROW co-location opportunities including an existing 115 kV transmission line, state highways, other roads and property lines also are utilized. Table 6.4-1 lists the main roads that this route would follow and traffic data, if available, for those roads.

Table 6.4-1. Average Annual Daily Traffic for Selected Roads Parallel to the Applicant Preferred Route

Applicant Preferred Route	Existing Average Annual Daily Traffic	Parallel Length (miles)
Interstate 94	16,200 to 20,700	17.8

Source: Minnesota Department of Transportation, 2006-2009.

There is one full service rest area in the Alexandria to Sauk Centre section that may be affected by the Applicant Preferred Route. The Burgen Lake rest area (for westbound traffic) is located 1.5 miles east of Hwy 29 in Douglas County (Mn/DOT, 2009b).

Table 6.4-2 lists the main roads that Route A would follow and traffic data, if available, for those roads.

Table 6.4-2. Average Annual Daily Traffic for Selected Roads Parallel to Route A

Roads	Existing Average Annual Daily Traffic	Parallel Length (miles)
County Road 29 (Stearns)	270	0.8
US Highway 71	3,450	1.0
County Road 187 (Stearns)	270	2.0
425th Avenue	NA	2.5
County Road 184 (Stearns)	365	2.3
County Road 183 (Stearns)	305	0.3
440th Street	75	1.5
470th Street	35	0.5
County Road 2 (Douglas)	190	1.0
Cemetery Road SE	NA	1.5
Walsh Drive SE	NA	2.0
County Road 23 (Douglas)	600	1.0
Interstate 94	16,200 to 17,200	0.3

Source: Minnesota Department of Transportation, 2006-2009.

NA: Traffic data is not available for this roadway segment.

Table 5.4-3 lists the main roads that Route Options would follow and traffic data, if available, for those roads which are shown in Appendix G.

Table 6.4-3. Average Annual Daily Traffic for Selected Roads Parallel to Route Option Alternatives

Roads	Existing Average Annual Daily Traffic	Parallel Length (miles)
Option 4		
County Road 79 (Prairie Rd)	65	4.0
County Road 110	25	1.0
Option 5		
CSAH 46	210	0.3
CSAH 51	1,100	2.7
Option 6		
Parcel Lines	NA	1.5[a]
Option 7		
Parcel Lines	NA	2.0[a]

Source: Minnesota Department of Transportation, 2006-2009.

NA: Traffic data is not available for this roadway segment.

[a]Length of route along parcel lines

Option 4 is approximately five miles in length and deviates from Route A a half-mile east of CSAH 23 and travels along County Road 79 (Prairie Road) for four miles, then runs south along County Road 31 before rejoining Route A. Option 5 is approximately three miles in length and deviates from the Applicant Preferred route at CSAH 46 and Interstate 94, running eastward along a private road and a field for 0.7 miles, and southeast along CSAH 51 for 2.3 miles and rejoining the Applicant Preferred Route at CSAH 51 and Interstate 94. Option 6 would deviate from the Applicant Preferred Route at Interstate 94 and 435th Avenue, and run south along a field for 1.5 miles until joining Route A. Option 7 is approximately two miles in length and runs 1/2 mile south of and parallel to Route A between 470th Avenue and a point 0.7 miles east of County Road 183.

Airports

HVTLs can present an important safety concern to airports and aircraft. An airport, whether public or private, is defined by the state and the Federal Aviation Administration (FAA) as an area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any. 14 C.F.R. Part 1, §1.1 and Minn. R. 8800.0100, Subp. 3. The placement of transmission line structures or the stringing of conductors between structures could impact the safe operation of an airport or hinder the maneuverability of aircraft. If close enough, the presence of a steel transmission line structure or wiring could interfere with the operation of air navigation or weather systems.

The physical dimensions of airport runways determine the class size of aircraft capable of landing at an airport. Furthermore, the aircraft design and propulsion system are determinants in an aircraft's ability to land at a given facility. For example, jet aircraft are heavier, typically require a greater runway length for take-off and landing, and require more glide slope clearance distance compared to propeller-driven aircraft. Both of these factors are important in relation to structures such as transmission lines because they determine the take-off and landing glide slopes necessary for safe flight operation, which in turn determine the setback distance of structures such as transmission lines.

The FAA and Mn/DOT have established development guidelines on the proximity of structures, including HVTLs, to public use airports and heliports. Federal Aviation Regulation (FAR) Part 77 establishes standards and notice requirements for reporting airspace obstructions for objects currently impacting or that could impact navigable airspace around aviation facilities. FAR Part 77 defines a series of imaginary surface zones surrounding airports that specify height restrictions for structures based on slope ratios. These imaginary surfaces include the primary surface, horizontal surface, conical surface, approach surface, precision instrument approach surface, and the transitional surface. According to FAR Part 77, "an object will be considered an obstruction to a public airport (excluding seaplane bases and heliports) if it is of greater height" than any of the aforementioned imaginary surfaces. Each of these imaginary surfaces have corresponding slopes, based in part on the airports' use designation, flight volumes, and plane size capabilities. All surfaces are measured at the mean sea-level elevation of the airport. If necessary or appropriate, Applicants will file the required notice with FAA pursuant to the requirements set forth by FAR Part 77, Subsection 13.

In addition to FAA regulations, the state of Minnesota establishes air navigation obstruction criteria under Minn. R. Ch. 8800. These regulations are intended to control the type of development around airports to prevent incompatible land uses. The state regulations are similar to the FAA regulations as published in FAR Part 77. State runway Safety Zones A through C, which follow the runway approach zones and restrict specific types of development, are included as this part of these regulations. The most restrictive safety zones are A and B. Safety Zone A does not allow any buildings or temporary structures, places of public assembly or transmission lines; Safety Zone B does not allow places of public or semipublic assembly (i.e., churches, hospitals, or schools).

Permitted land uses in both zones include agricultural uses, cemeteries, and parking lots. A complete description and copy of the Minn. R. Ch. 8800 Department of Transportation Aeronautics Section 2400 Airport Zoning Standards can be found at http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html.

Furthermore, certain objects such as steel pole transmission line structures have the potential to conflict with the operation of airport navigational aids and weather observation station facilities. Specifically, these facilities include Very High Frequency Omnidirectional Radio Range (VOR) air navigation systems and Automated Weather Observation Stations (AWOS). FAA Order 6820.10 "VOR, VOR/DME, and VORTAC Siting Criteria," specifies the distance setback requirements for trees, buildings, and metallic structures. Within this order, obstruction criteria for a VOR facility are identified, in addition to setback distances for transmission line structures. These regulations specify that overhead transmission line structures with conductors should be located more than 1,200 feet from the VOR antenna to avoid communication interference. Additionally, the top of metallic structures are required to be at a vertical angle of 1.2 degrees or less, measured from the ground elevation of the VOR facility. As applied here, structures of 130 feet in height must be 6,206 feet away from a VOR air navigational station to avoid interference with the operation of the facility. Transmission structures of 140 feet in height must be 6,683 feet away and transmission structures of 175 feet in height must be 8,354 feet away from a VOR.

There are two public-use and one private-use airport within five miles of both the Preferred Route and Route A. Construction around private-use airports is not subject to FAA navigable airspace regulations, but use of these airports could be impacted by the placement of poles or conductors. Construction near public-use airports may require filing an FAA construction notice. The public airports are Chandler field and Sauk Centre Municipal.

6.4.2 Potential Impacts

The primary impacts related to roadways involve compatibility with roadway expansion plans, safety requirements, and temporary construction impacts.

Roadway ROW and Expansion Plans

The applicants have indicated that a 150-foot wide ROW (easement) would be required for the proposed transmission line. Specialty structures may be required for long spans or in environmentally sensitive areas. In these cases, a ROW of up to 180 feet may be required. When a transmission line is placed entirely across private land, an easement for the entire 150-foot to

180-foot-wide ROW would need to be acquired from the landowner(s). The applicants have indicated they would locate the poles as close to property division lines as reasonably feasible to reduce the amount of ROW impact on a particular property.

When paralleling roadways, the applicants plan to install poles just outside the public roadway ROW. Placement of poles would typically range from 25 feet to 75 feet into fields or other private property when possible. Thus, although the pole is still located on private property, the transmission line can occupy some of the public ROW, thereby reducing the size of the easement required from the private landowner. For example, if the required ROW is 150 feet, and the pole is placed 25 feet off of an existing road ROW, then a 100-foot easement would be required from the landowner. The transmission line ROW would occupy a 50-foot-wide section of roadway ROW. By keeping the poles at least 25 feet from the roadway ROW, the potential for having to relocate utility poles due to future roadway expansions is reduced.

In order to occupy roadway ROW, the applicants would need to acquire necessary approvals from the owner or the agency (e.g., Mn/DOT). Mn/DOT's Utility Accommodation Policy outlines the policies and procedures governing use and collocation of state trunk highway ROWs by utilities. The policy was developed in accordance with the requirements of state and federal law (Code of Federal Regulations, Title 23, Part 645, Subpart B). It is designed to ensure that the placement of utilities does not interfere with the flow of traffic and the safe operation of vehicles.

Mn/DOT has a responsibility to preserve the public investment in the transportation system and to ensure that non-highway uses of the ROW do not interfere with the ability of the state to make long-term highway improvements, such as adding lanes, interchanges, or bridges, or to safely maintain the existing system. In addition, state law requires Mn/DOT to reimburse the utility if a utility must be relocated from an ROW along an interstate highway as a result of future expansion or new interchanges.

Requirements vary based on whether the utility is crossing the highway or being installed parallel to it, and on the type of highway. For controlled access highways or freeways, Mn/DOTs Utility Accommodation Policy states: "The installation of new utility facilities shall not be allowed longitudinally within the right-of-way of any freeway, except in special cases under strictly controlled conditions." This means that the transmission structure–the poles and davit arms–must be completely outside of the ROW. For this project, this would mean placing a pole approximately 20 to 25 feet outside the right-of-way.

The Utility Accommodation Policy does provide for exceptions where special circumstances exist. If the highway is part of the National Highway System, the exception must be approved by the Federal Highway Administration and would be considered a federal action, meaning that the requirements of the National Environmental Policy Act must be met.

Future Roadway Improvement Projects

Mn/DOT State Transportation Improvement Program contains a list of programmed projects that have received funding for fiscal years 2010-2013 in the study area. The Mn/DOT Statewide 20-Year Highway Investment Plans: 2009-2028 contains descriptions of planned projects that

may be implemented at a future date. Each of these documents were reviewed to determine which programmed (funded) and planned projects may be impacted by the project alternatives. A summary of these projects in presented in Table 5.4-4 and illustrated in Appendix H.

Table 6.4-4. Programmed and Planned Projects Within Study Area.

Route	Project Area	Length (miles)	Description	Potential Route Impacts					
				Applicant Preferred Route	Route A	Option 4	Option 5	Option 6	Option 7
Interstate 94	Osakis to Alexandria	12	Resurface	X	X				
State Highway 29	State Highway 29/ Interstate 94	0.5	Rehab 2 bridges over Interstate 94	X	X				

Roadway ROW and Safety Requirements

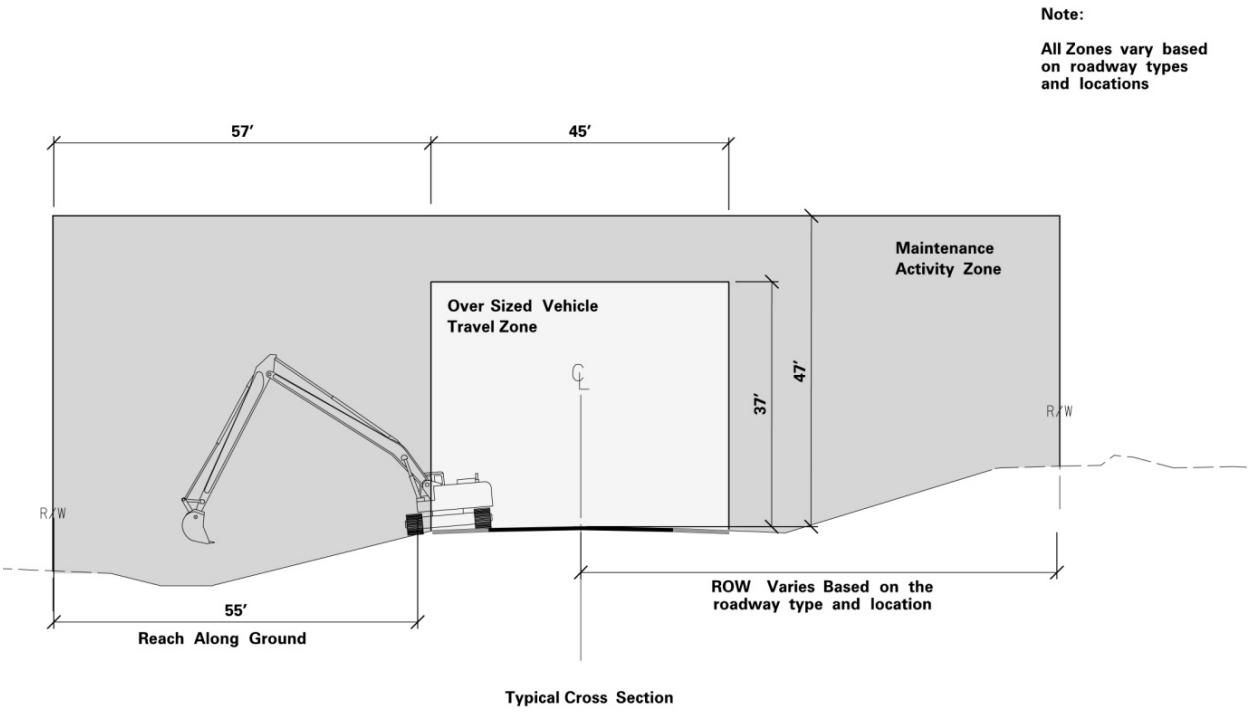
The poles must also be located a sufficient distance from the edge of the traveled roadways so as not to present a safety hazard. Most roadways have clear zones to provide a safety buffer between the roadway and adjacent land uses for errant vehicles. These areas may consist of a shoulder, a recoverable slope, a non-recoverable slope, or a clear run-out area. Requirements for clear zones and roadside obstruction vary based on traffic volume, design speed, roadside geometry, radius of horizontal curve, presence of a curb, and presence of urban or rural roads, collectors, arterials, or freeways. A brief review of clear zone requirements from state and federal manuals provides some guidance.

For very low-volume local roads, such as township roads, the American Association of State Highway and Transportation Officials state that, "at a location where a clear recovery area (an area free of hazards along the edge of a road) of two meters (6 feet) or more in width which can be provided at low cost and with minimum social/environmental impacts, provision of such a clear recovery area should be considered." (AASHTO Green Book, 2001). However, they also state that where constraints make these impractical, clear recovery areas of less than two meters may be used. They also suggest consideration of other factors including the presence of vehicles wider than 2.6 m (8.5 ft) such as farm equipment.

The Mn/DOT Road Design Manual Part I and Part II, Chapter 4 (4-6(6)-4-6(20)) provides charts to determine clear zone widths based on speeds and side slope type. There are 11 different tables in this manual for determining clear zone widths based on daily traffic, cut or fill slopes, and design speed. In addition, the State of Minnesota also provides a formula for adjusting the clear zone on the outside of horizontal curves and a table for increasing clear zone widths when there are curbs greater than four inches. Given the complexity of roadway design, it

is not appropriate to generalize about what is considered "safe" in regard to placing transmission line poles adjacent to roadways. The safe zone would have to be determined on a case by case basis. To obtain a general sense of this issue, Diagram 6-4 depicts a "zone of activity" as defined by Mn/DOT. In general, impacts to this zone should be avoided to minimize safety related issues associated with normal traffic operations.

Diagram 6-4. Mn/DOT Zone of Activity



The alternatives could have potential safety implications for roadway maintenance. Typical roadway and right-of-way maintenance activities, such as mowing, refuse and debris removal, and sign replacement and inspections may occur in close proximity to the transmission lines.

The presence of maintenance equipment and personnel near transmission lines may increase the risk of coming into contact with the transmission lines or arc flashes, especially from high temperatures, wind, and precipitation that cause sagging or blowouts.

Under certain wind conditions, the conductors could sway or "blow out" over the right-of-way. This type of blowout potential occurs when the wind essentially pushes the conductors sideways and up into the airspace above the right-of-way. Moisture and ice can also cause the transmission lines to sag to lower than normal heights.

The type of ROW occupancy option selected may have different impacts on these activities. The greater the amount of ROW occupancy, the greater the potential there is for safety impacts to maintenance activities and personnel. A greater ROW occupancy (e.g. 5 feet versus 75 feet from the edge of ROW) may potentially place limits on how roadway and ROW maintenance activities are carried out.

The safe movement of oversized goods could potentially be impacted by the alternatives. Interstate 94 from St. Cloud to Moorhead is designated as a Super haul corridor. Super haul corridors are characterized as routes that can handle a 16-foot height limit, a 16-foot width limit with and 8-foot wide axle, a 130-foot length limit, and a 235,000 lbs weight limit. Mn/DOT is responsible for preserving the ability to accommodate these characteristics and improve upon them if feasible.

Temporary Construction Impacts

Most of the transportation related impacts due to the project would be from construction activities and would also be temporary in nature. Temporary access for the construction of the new transmission lines would require a 20-foot-wide access trail constructed within the transmission line ROW or by short spur trails from the existing road network to the ROW. In some situations, private field roads or trails are used. Permission form the property owner is obtained prior to accessing the transmission line route. New access roads may also be constructed when no current access is available or if the existing access is inadequate.

Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Temporary traffic impacts associated with construction equipment include material delivery and worker transportation. Typical construction equipment used on similar transmission line projects include tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor trailers, flatbed trucks, pickup trucks, concrete trucks and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers.

It is estimated that construction of the transmission line and substation modifications would require 40 full-time employees with 25 devoted to transmission line construction and 15 to substation modifications. Part-time personnel may also be needed. Construction of the concrete foundations for the pole is estimated to require 5-6 concrete trucks. Given the small number of workers and construction vehicles, traffic disruptions would be minimal and localized.

Staging areas are usually established for the project, as well as temporary lay-down areas. Materials are delivered to staging areas and stored until they are needed. Any staging or temporary lay-down areas outside of the transmission ROW would require permission from the landowners through rental agreements.

Construction activities along the Preferred Route have the potential to impact planned projects including a resurfacing of Interstate 94 between Osakis to Alexandria (12 miles), and the rehabilitation/replacement of the two State Highway 29 bridges over Interstate 94 in Douglas County. Impacts would depend on the timing of transmission line construction and roadway construction, as well as the proximity of the transmission line to the actual roadway construction activities.

Impacts to roadway traffic flow during construction are expected to be minimal. Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Transportation related impacts associated with Route A are similar to those described above for the Preferred Route. Most of the impacts are primarily from construction activities and would be temporary in nature. New access roads may also be constructed when no current access is available or if the existing access is inadequate. Construction activities along Route A have the potential to impact future roadway projects. Programmed projects include a resurfacing of Interstate 94 between Osakis to Alexandria (12 miles), and the rehabilitation/replacement of the two State Highway 29 bridges over Interstate 94 in Douglas County.

Transportation related impacts associated with Route Options 4, 5, 6, and 7 are similar to those described above for the Preferred Route. Most of the impacts are primarily from construction activities and would be temporary in nature. New access roads may also be constructed when no current access is available or if the existing access is inadequate. Construction activities along Options 4, 5, 6 and 7 are not expected to impact any programmed or planned projects.

Airports

Construction occurring near Chandler Field, in the Preferred Route or Route A will exceed the FAA Construction Notice Criteria for horizontal distance, therefore filing with the FAA prior to construction is required.

Near Sauk Centre Municipal Airport, construction occurring along the Preferred Route, Route A, or Option 6 will exceed the FAA Construction Notice Criteria, therefore filing with the FAA prior to construction is required.

Applicants have met with the city of Sauk Centre. Sauk Centre identified plans to extend the Sauk Centre Airport's north-south orientated runway further to the north and south, although to a greater distance to the south. Applicants understand that the type of instrumentation used for the airport may also be modified. Both considerations may have an affect on allowable heights of structures within the approach path, and otherwise within proximity to the airport. As a result, the Preferred Route has been widened beyond 1,000 feet along Interstate 94 and north of the Sauk Centre Airport. Applicants will continue to coordinate with Sauk Centre to review placement of the proposed 345 kV transmission line as it relates to the airport and incorporate any alternative engineering or design considerations, as applicable or appropriate.

The Preferred Route, Route A, Options 4, 5, 6, and 7 are not expected to impact any VORs.

6.4.3 Mitigation

Following is a discussion for mitigation on roadways and airports.

Roadways

Before construction begins, some potential impacts can be mitigated via coordination with the appropriate agencies and organizations regarding the placement of structures and construction methods. Final structure locations, ROW, and any disturbed areas could be determined by

considering input from responsible transportation agencies (e.g. Mn/DOT, counties, townships) to minimize visual or construction impacts. Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design. The construction contractor could coordinate construction activities with the appropriate road agencies to avoid interference with their roadway construction and maintenance activities. The construction contractor should also work with the appropriate agencies to minimize impacts on roadway clear zones and rest areas.

Consideration of planned future transportation improvements could be made to select specific alignments that may be less likely to require future relocation. Where practical, crossings of roadway rights of way may be perpendicular to minimize the occupancy of roadway right of way airspace.

Construction of the project may require the use of private field roads or trails. The use of these access paths, plus the construction or use of any temporary access roads, staging or lay-down areas outside of the transmission ROW could require permission from the landowners through rental agreements. These areas should be restored to their preconstruction condition as much is feasibly possible, and may include regrading areas and restoring vegetation.

During construction, temporary guard structures may be used to string conductors over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Additional shielding of the transmission lines and equipment may be required in areas where roadway and ROW maintenance activities are expected to occur in close proximity with the transmission lines on a regular basis.

The additional construction and maintenance traffic on the surrounding roadway system is not expected to have a significant impact on traffic operations, and therefore, no mitigation is required.

Airports

With the proper safeguards and protective measures described above, impacts related to public health and safety are not anticipated. In addition, the proposed structures will comply with all FAA airport and VOR height restrictions. Therefore, no additional mitigative measures are proposed.

6.5 WIRELESS TECHNOLOGIES

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted (corona consists of the breakdown or ionization of air within a few centimeters of conductors and hardware). This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

6.5.1 Affected Environment

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

FM radio receivers usually do not pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz), and
- The excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and 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.

Digital reception is in most cases more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they would impact digital television reception.

6.5.2 Potential Impacts

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose or damaged hardware may also cause television interference. The transmission line hardware would be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If interference occurs, Applicants could work with the microwave tower owner to mitigate the impacts.

If interference from transmission line corona does occur for an AM radio station that is within the station's primary coverage area and that had good reception before the project was built, satisfactory reception can be obtained by appropriate modification of the receiving antenna system. No widespread interference to television or radio reception is anticipated as a result of the project.

There is one communication tower within the Applicant Preferred Route.

6.5.3 Mitigation

The transmission line hardware would be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If

interference occurs, Applicants could work with the microwave tower owner to mitigate the impacts.

If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations can be restored by appropriate modification of (or addition to) the receiving antenna system. In addition, if isolated radio or television interference occurs because of the transmission line, the Applicant could work with the affected landowner to restore reception to pre-project quality.

If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, Applicants could inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary.

In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants could work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

Digital reception is, in most cases, more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they will impact digital television reception. In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants would work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

6.6 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Archaeological and historic architecture resources are those places that represent the visible or otherwise tangible record of human activity on the landscape. These resources vary in size, shape, condition, and importance, among other considerations; some are buried, while others are clearly evident on the landscape. The resources include pre-contact (Native American) archaeological sites, historic-period (Euroamerican) archaeological sites, and 19th and 20th century buildings, bridges, railroads, and industrial sites.

6.6.1 Affected Environment

Definitions of terms clarify the meaning of locations as they relate to the project. The "project" refers to any action taken to construct or operate the transmission line. The "project route" refers to any of the potential routes being discussed at this time and the impact area of the transmission line whether from construction or operation. An 'archaeological resource' refers to any surface or buried resource showing past human activity. A 'historic architecture resource' refers to any standing post contact building or structure. The 'Applicant' refers to Xcel Energy and Great River Energy.

In May of 2009 the Applicant reviewed records in the Minnesota State Historic Preservation Office (SHPO) archaeological and historic architecture resource database. Records were reviewed to document previously identified resources within the project vicinity.

The information generated for this section was compiled using the text from section 7.1.3, 7.2.3, and 8.7.4 of the "Application to the Minnesota Public Utilities Commission for a Route Permit for the Fargo to St. Cloud 345 kV Transmission Line Project, Docket # ET2, E002/TL-09-1056." The Applicant states previous cultural resource inventory report data are available. The inventory of the selected route includes a detailed discussion of previous cultural resources studies in the vicinity.

6.6.2 Potential Impacts

The Alexandria to Sauk Centre section of the Applicant Preferred Route contains no archaeological resources and two historic architecture resources The historic architecture resources in this section of the route may contain multiple building(s) and/or structure(s) listed on the NRHP. Project plans and engineering efforts will strive to physically avoid all of these resources.

This section of Route A does not contains any previously recorded archaeological or historic architecture resources.

Route options 4, 5, and 7 were developed after submittal of the permit application. Hence, no discussion of cultural resources has occurred for these Options. Option 6 does not contain any previously recorded archaeological or historic architecture resources. The possibility exists for one route with multiple options to be selected as the final Route. If this is the case the Applicant should follow the process proposed in Section 6.6.3 below to adequately consider the resources in the final selected Route.

6.6.3 Mitigation

Impacts to archaeological resources occur from ground disturbing activity during construction or operation of the project. These impacts can harm the information potential of the resource. No archaeological resources have been identified within the Applicant Preferred Route, Route A, and Option 6. Impacts to the majority of these resources can be avoided by clear designation of the resource area, adjustments to the construction footprint, and designation of no construction and operation buffers around the resources. However, certain archaeological resources may be sensitive to visual intrusion. If such archaeological resources are identified within the project route, the Applicant should coordinate with SHPO as the sensitivity of this resource as it relates to the project action. Archaeological resource inventories should be completed in areas proposed for ground disturbance to identify undocumented archaeological resources. If archaeological resource cannot be avoided, resource evaluation leading to specific treatment could be developed by the Applicant in coordination with SHPO, Office of the State Archaeologist (OSA), and the Office of Energy Security (OES) to mitigate the adverse impact caused by this project.

Impacts to historic architecture resources can result from physical damage to the structure or from construction/operation of the project. Indirect impacts can result from visual intrusions of

project elements on the historic character or historic setting of the historic architecture resource. A total of two historic architecture resources have been identified within the Applicant Preferred Route, Route A, and Option 6. Direct impacts to these resources can be avoided by identifying no construction and/or operation buffers, adjustment to project design so as to not impact the historic architecture resources physical makeup, and understand construction techniques so as to not harm historic architecture resource foundations. In addition, indirect impacts to a historic architecture should be considered and treatment techniques should be developed in coordination with SHPO, OES, and possibly OSA. A discussion may be needed with the regulating agencies concerning indirect impacts for any of the historic architecture resources that are listed or eligible for listing on the NRHP. If any historic architecture resource cannot be avoided, resource evaluation leading to specific treatment could be developed by the Applicant in coordination with SHPO, OSA, and the OES to mitigate the adverse impact caused by this project.

The Applicant does not anticipate physical impacts to previously identified archaeological or historic architecture resources within the Applicant Preferred Route, Route A, or Option 6 as a result of project construction and/or operation. Avoidance will be used as a first step to mitigate impacts to archaeological and historic architecture resources. In the event that an impact occurs, coordination with SHPO, OSA, and OES may be needed and if applicable, further evaluation of the impacted resource to understand its eligibility for listing in the NRHP.

Upon selection of the final route the Applicant should sponsor a Phase Ia Literature Search of the review area (the review area is defined to be the project area plus one mile buffer around the project boundary). This information, possibly combined with other supplementary information, will identify the types of additional archaeological or historic architecture resources that could be located within the selected route. The Applicant can then use this information to develop a survey methodology appropriate for locating such resources. SHPO and OSA should be engaged to elicit any specific knowledge they have concerning the selected route.

The Applicant should then sponsor a Phase I Reconnaissance Survey within the selected route to identify additional undocumented archaeological and historic architecture resources. Once these resources are identified and project effects to these resources are understood communication should occur between the Applicant, SHPO, OSA, and OES. The communication between the parties should center on the resources that will be impacted by the project action.

Once an evaluation strategy for the impacted resources is complete, the Applicant should sponsor a Phase II Intensive Survey at these identified locations, if needed. Those resources deemed significant and eligible for listing or listed on the NRHP will require treatment. These treatment plans should be developed by the Applicant in coordination with SHPO, OSA, OES, and any other identified applicable party.

If needed, the Applicant should sponsor a Phase III Treatment activity for identified resources that are eligible for listing or listed on the NRHP that will receive impact. The result of the Phase III Treatment activity would provide documentation that the treatment plan(s) were carried out and completed in full.

6.7 LAND-BASED ECONOMIES

The primary land based economy in the area of the project is agriculture. Agricultural impacts are an important issue with respect to economics, soil, and land use. This section discusses the potential project impacts on agriculture, as well as forestry, tourism, and mining.

6.7.1 Affected Environment

Agriculture

According to the U.S. Department of Agriculture 2007 Census of Agriculture, primary crops in the project area are corn, soybeans, oats, wheat, sugar beets, and hay. Primary livestock found within the project area include dairy cattle, beef cattle, sheep, swine, and poultry. Table 6.7-1 illustrates the number of farms, average farm size, acres of farmland, market value of agricultural products, and market value of agricultural products per acre of farmland for each county within the project area between Alexandria and St. Cloud.

Table 6.7-1. Agricultural Production within Project Area by County

County	Number of Farms	Average Farm Size (acres)	Acres of Farmland	Market Value of Agricultural Products (millions of dollars)	Market Value of Agricultural Products per Acre of Farmland (dollars)
Douglas	1,199	219	262,695	$65	$247
Pope	1,055	341	360,095	$117	$325
Stearns	3,368	210	708,284	$519	$733
Todd	1,910	198	378,374	$149	$394

The majority of lands within the proposed routes between Alexandria and Sauk Centre are zoned for agriculture. Refer to Table 6.7-2 below for the percentage of land zoned for agriculture in each route, route option, and post scoping option.

Table 6.7-2 Percent of Land Zoned Agricultural (Route)

Route/Option	Percent of Route Zoned Agriculture	Percent of Route Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred Route	58	-
Route A	77	0.05
Route Options		
Option 4		
Route A	64	-
Option 4	73	-
Option 5		
Applicant Preferred Route	93	-
Option 5	99	-
Option 6		
Applicant Preferred Route	63	-
Option 6	99	-

Note: Option 7 is not presented because it is a wider area and does not include a centerline or alignment, its impacts are presented in the ROW section.
Source: NCLD, 2001.

Fifty-eight percent of lands occurring within the Preferred Route are zoned for agriculture. Seventy-seven percent of lands occurring within Route A are zoned for agriculture, including approximately 0.05 percent of those as special protection agriculture between Alexandria and Sauk Centre. Center pivot irrigation systems are used for agriculture in the project area. The Route Options are primarily zoned for agriculture.

During public outreach meetings for the Project, some landowners expressed concerns with whether high voltage transmission lines could interfere with electromagnetically guided cornering systems that some center pivot irrigation systems utilize. A study published in the Institute of Electronics and Electrical Engineers Transactions on Power Delivery (Olsen and Heins, 1998) found that the level and frequency of magnetic fields required to cause interference with the electromagnetically guided cornering systems is significantly higher than found near most high voltage transmission lines. Refer to Table 6.7-3 below for the number of center pivot irrigation systems found in each route, route option, and post scoping option.

Table 6.7-3. Center Pivot Irrigation Systems by Route (Alexandrian to Sauk Centre)

Route/Option	Number of Center Pivot Irrigation Systems in Route)
Route Alternatives	
Applicant Preferred Route	3
Route A	11
Route Options	
Option 4	
Route A	2
Option 4	0
Option 5	
Applicant Preferred Route	1
Option 5	1
Option 6	
Applicant Preferred Route	0
Option 6	0

Note: Option 7 is not presented because it is a wider area and does not include a centerline or alignment, its impacts are presented in the ROW section.

Route A includes the greatest number of center pivot irrigation systems.

Prime Farmland

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides soil surveys with detailed soil geographic data developed by the National Cooperative Soil Survey. The purpose of the data is to provide consistent soil mapping data and provides an inventory of important farmlands. Agricultural land designated as 'prime farmland,' indicates land that is most desirable for agricultural production. According to Federal regulation prime farmland is defined as, "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses" (7 CFR, 657.5 (a) (1)). Further land that is designated as 'farmland of statewide importance' is, "land; in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods" (7 CFR, 657.5 (c).

Refer to Table 6.7-4 for the acreage of prime farmland within the proposed routes.

Table 6.7-4. Acreage of Prime Farmland within Route and Option Alternatives

Route/Option	Prime Farmland in Route (Acres)
Route Alternatives	
Applicant Preferred Route	1,633
Route A*	1,548
Route Options	
Option 4	
Route A	40
Option 4	77
Option 5	
Applicant Preferred ROW Occupancy	98
Option 5	53
Option 6	
Applicant Preferred Occupancy	560
Option 6	656

Note: Option 7 is not presented because it is a wider area and does not include a centerline or alignment, its impacts are presented in the ROW section.

Forestry

The proposed routes and options are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within MnDNR managed lands. The wooded areas are located primarily on privately held lands. The wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state.

Refer to Table 6.7-5 for the estimated acreage of wooded lands within each route and option.

Table 6.7-5. Wooded Lands by Route (Alexandria to Sauk Centre)

Route/Option	Wooded Lands in Route (Acres)
Route Alternatives	
Applicant Preferred Route	295
Route A*	467
Route Options	
Option 4	
Route A	96
Option 4	43
Option 5	
Applicant Preferred Route	15
Option 5	19
Option 6	
Applicant Preferred Route	141
Option 6	113

Note: Option 7 is not presented because it is a wider area and does not include a centerline or alignment, its impacts are presented in the ROW section.

Source: NCLD, 2001.

Tourism

The majority of tourism activities or opportunities along the proposed routes and Route Options are associated with recreational uses. Refer to section 6.3 for a discussion of recreational uses along the proposed routes between Alexandria and Sauk Centre.

Mining

In 1984, Minnesota Statues 84.94 was passed, which required each county in Minnesota to identify and protect aggregate resources. Since then, counties in Minnesota have begun to identify areas of potential mining and develop long-term comprehensive plans that incorporate aggregate resources. No counties in the Alexandria and Sauk Centre area have complete mapping of Aggregate Resources by the MnDNR. Stearns County mapping is in progress. Due to the incompleteness of the mapping across the project area, aggregate resources in the project area were identified using the Mn/DOT Aggregate Source Information System, which is a database of aggregate sources that are depicted on County Pit Maps. County Pit Maps show the locations of gravel pits, rock quarries, and commercial aggregate sources. The maps were completed prior to 2003 and there are no plans to update the maps.

Table 6.7-6. Aggregate Sources (Alexandria to Sauk Centre)

Route	Total Number of Aggregate Sources in Route	Aggregate Source Status			
		Source Status Prospected Pit	Inactive Aggregate Source	Commercial Aggregate Source	Mn/DOT owned or managed Aggregate Source
Route Alternatives					
Applicant Preferred Route	4	4	-	-	-
Route A*	1	1	-	-	-
Route Options					
Option 4					
Route A	0	-	-	-	-
Option 4	0	-	-	-	-
Option 5					
Applicant Preferred Route	0	-	-	-	-
Option 5	1	1	-	-	-
Option 6					
Applicant Preferred Route	4	4	-	-	-
Option 6	0	-	-	-	-

Note: Option 7 is not presented because it is a wider area and does not include a centerline or alignment, its impacts are presented in the ROW section.

Based on the Aggregate Source Information System database, four aggregate sources are identified in the Preferred Route and only one aggregate source is identified in Route A between Alexandria and Sauk Centre. All of the aggregate sources are prospected aggregate pits near Sauk Centre in Stearns County that are prospected and/or leased by Mn/DOT. Route Option 5 includes one additional aggregate source but Option 6 does not include any aggregate sources. Table 6.7-6 depicts the aggregate sources located in each route based on the Aggregate Source Information System database.

6.7.2 Potential Impacts

Agriculture

The majority of the lands in the area between Alexandria and Sauk Centre are agricultural. Refer to Table 6.7-7 below for percentage of lands zoned for agriculture and Table 6.7-8 for the number of center pivot irrigation systems within each ROW for the proposed route, route options, and post scoping options followed by a discussion of these impacts.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. Impacts associated with the proposed routes and options assume 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other

work areas. Temporary impacts are estimated at a rate of one acre per pole. In order to calculate impacts to agriculture vegetation the National Land Cover Data was applied. Agricultural lands include pasture/hay land, row crops and small grains. Vegetation is comprised of wooded and non-wooded lands that are not agriculture. Refer to Table 6.7-9 below for estimated temporary and permanent impacts to vegetation between Alexandria and Sauk Centre.

Table 6.7-7. Percent of Land Zoned Agricultural (Alignment ROW)

Route/Option	Percent of ROW Zoned Agriculture	Percent of ROW Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred ROW Occupancy	58	
Applicant Preferred No ROW Occupancy	58	-
Route A	71	0.06
Route Options		
Option 4		
Route A	65	-
Option 4	74	-
Option 5		
Applicant Preferred ROW Occupancy	95	-
Applicant Preferred No ROW Occupancy	95	-
Option 5	92	-
Option 6		
Applicant Preferred ROW Occupancy	68	-
Applicant Preferred No ROW Occupancy	68	-
Option 6	96	-
Option 7		
Route A	100	-
Option 7	100	-

Table 6.7-8. Center Pivot Irrigation Systems by ROW

Route/Option	Number of Center Pivot Irrigation Systems in ROW
Route Alternatives	
Applicant Preferred ROW Occupancy	1
Applicant Preferred No ROW Occupancy	1
Route A	11
Route Options	
Option 4	
Route A	2
Option 4	0
Option 5	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 5	0
Option 6	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 6	0
Option 7	
Route A	6
Option 7	1

Table 6.7-9. Temporary and Permanent Impacts to Agricultural Lands

Route/Option	Estimated Number of Poles	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (1,000 SF Per Pole) SF	Permanent Impacts (1,000 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	150	150	8,264	0.19
Applicant Preferred No ROW Occupancy	147	147	8,087	0.18
Route A	183	183	10,055	0.23
Route Options				
Route Option 4				
Route A	21	21	1,159	0.03
Option 4	24	24	1,347	0.03
Route Option 5				
Applicant Preferred ROW Occupancy	17	17	929	0.01
Applicant Preferred No ROW Occupancy	16	16	898	0.01
Option 5	16	16	901	0.01
Route Option 6				
Applicant Preferred ROW Occupancy	38	38	2,090	0.05
Applicant Preferred No ROW Occupancy	38	38	2,114	0.04
Option 6	62	62	3,423	0.08
Route Option 7				
Route A	19	19	1,068	0.02
Option 7	12	12	682	0.01

Source: NCLD, 2001.

Applicant Preferred Route

Fifty-eight percent of the lands occurring within the Preferred Route ROW and No ROW Occupancy ROWs are zoned for agriculture between Alexandria and Sauk Centre. There is one center pivot irrigation system located within each alternative.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. The permanent impacts associated with the Applicant Preferred Route ROW Occupancy between Alexandria and Sauk Centre represents approximately 0.19 acres and 0.18 acres for the No ROW Occupancy alignment, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other work areas. Temporary impacts are estimated at approximately 150 and 147 acres, based on a rate of one acre per pole for the Applicant Preferred Route ROW Occupancy alignment and the No ROW Occupancy alignment.

Route A

Seventy-one percent of the lands within the Route A ROW are zoned for agriculture including 0.06 percent of those as special protection agriculture. Eleven center pivot irrigation systems are located within the Route A ROW.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. These permanent impacts associated with Alternate Route A between Alexandria and Sauk Centre represent approximately 0.23 acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 183 acres, based on a rate of one acre per pole.

Option 4

Seventy-four percent of the lands within the Option 4 ROW are zoned for agriculture whereas only sixty-five percent of Route A is zoned for agriculture at this location. There are no center pivot irrigation systems in the Option 4 ROW but there are two within the Route A ROW at this location. Route Option 4 is slightly longer than Route A but it's overall permanent impacts would be similar. The temporary impacts to agriculture from Option 4 would include three more acres than would be impacted by Route A.

Option 5

Ninety-two percent of the lands within the Option 5 ROW are zoned for agriculture whereas ninety-five percent of the Applicant Preferred Route ROW Occupancy and No Occupancy ROWs are zoned for agriculture. There are no center pivot irrigation systems in either ROW at this location. The permanent and temporary impacts are generally the same for both options except the Applicant Preferred ROW Occupancy alignment which would impact one additional acre of agricultural land.

Option 6

Ninety-six percent of the lands within the Option 6 ROW are zoned for agriculture whereas sixty-eight of the Applicant Preferred Route ROW Occupancy and No Occupancy ROWs are zoned for agriculture. There are no center pivot irrigation systems in either ROW at this location. The permanent impacts to agricultural lands are minimal but still higher for the Option 6 alignment than the Applicant Preferred Route ROW Occupancy and No Occupancy ROWs. The temporary impacts from the Option 6 ROW include 24 additional acres of agricultural lands.

Option 7

One hundred percent of Option 7 is zoned for agriculture as is the Route A ROW at this location. There is one center pivot irrigation system within the Option 7 area and six within Route A at this location. The permanent impacts to agricultural lands are minimal but slightly lower for the Option 7 ROW than the Applicant Preferred Route ROW Occupancy and No

Occupancy ROWs. The temporary impacts from the Option 7 ROW include seven fewer acres of agricultural lands.

Prime Farmland

Prime farmland resources are an important contribution to the land based economics of the counties between North Dakota and Alexandria. Refer to Table 6.7-10 for the acreage of prime farmland within the proposed route and route option ROWs.

Table 6.7-10. Acreage of Prime Farmland within the ROW for Route and Option Alternatives

Route/Option	Prime Farmland in ROW (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	216
Applicant Preferred No ROW Occupancy	211
Route A	215
Route Options	
Option 4	
Route A	5
Option 4	12
Option 5	
Applicant Preferred ROW Occupancy	12
Applicant Preferred No ROW Occupancy	12
Option 5	8
Option 6	
Applicant Preferred ROW Occupancy	77
Applicant Preferred No ROW Occupancy	76
Option 6	98
Option 7	
Route A	8
Option 7	9

Agricultural land designated as 'prime farmland,' indicates land that is most desirable for agricultural production based on soils data. Overall, the Preferred Route alternatives and Route A impact a relatively similar amount of prime farmland. Options 4 would impact a greater amount of prime farmland than Route A and Option 5 represents a reduction in impacts over and the Applicant Preferred Route ROW and No ROW Occupancy alternatives. Option 6 represents a greater impact to prime farmland than the Applicant Preferred Route ROW and No ROW Occupancy alternatives and Option 7 impacts only one additional acre over Route A.

Forestry

The proposed routes are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within MnDNR managed lands. Forest resources,

notably tree stands, are present along the proposed routes. Refer to Table 5.7-11 for the acreage of wooded lands within each ROW for route options between Alexandria and Sauk Centre.

Table 6.7-11. Impacts to Wooded Lands

Route/Option	Wooded Lands in ROW (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	45
Applicant Preferred No ROW Occupancy	47
Route A	66
Route Options	
Option 4	
Route A	18
Option 4	8
Option 5	
Applicant Preferred ROW Occupancy	2
Applicant Preferred No ROW Occupancy	3
Option 5	1
Option 6	
Applicant Preferred ROW Occupancy	21
Applicant Preferred No ROW Occupancy	21
Option 6	19
Option 7	
Route A	4
Option 7	2

Source: NCLD, 2001.

The Applicant Preferred Route impacts less acreage of wooded lands than Route A. Options 4, 5, 6, and 7 all impact fewer acres of wooded lands than their alternates.

The wooded areas are located primarily on privately held lands. Wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state. According to the MnDNR, Forestry Division, Fiscal Year 2010 Harvest Plans no townships within the proposed routes or Route Options have timber harvest plans. Impacts on forest resources will occur at locations where trees will be cleared within the right-of-way. No impacts on commercial forest resources will occur. Impacts on wooded lands have been minimized by locating the proposed routes to minimize tree clearing to the extent feasible. As a result, no mitigative measures are proposed.

Tourism

No impacts to tourism are anticipated between Alexandria and Sauk Centre. The majority of tourism activities or opportunities along the Applicant Preferred Route, Route A and Route

Options between Alexandria and Sauk Centre are associated with recreational uses. Refer to Section 6.3 for a discussion of recreational uses along the proposed routes.

Mining

There are fewer aggregate source pits within Alternate Route A than the Preferred Route however, based on the Aggregate Source Information System database there are no aggregate sources within the assumed ROW for the Preferred Route, Route A or the Route Options between Alexandria and Sauk Centre.

6.7.3 Mitigation

Agriculture and Prime Farmland

Together with the Department of Agriculture and other parties, Applicants have developed an Agricultural Impact Mitigation Plan (AIMP) to identify measures the utilities could take to avoid, mitigate, repair, and/or provide compensation for impacts that may result from construction of the proposed transmission facilities. A copy of the final AIMP is included in Appendix G.

Landowners could be compensated for the use of their land through easement payments. To minimize loss of farmland and to ensure reasonable access to the land near the poles, Applicants prefer to place the poles approximately five feet from the road right-of-way. When possible, Applicants intend on attempting to construct the transmission line before crops are planted or following harvest. Applicants intend on compensating landowners for crop damage and soil compaction that occurs as a result of the project. Soil compaction could be addressed by compensating the farmer to repair the ground or by using contractors to chisel-plow the site. Normally, a declining scale of payments is set up over a period of a few years.

To further minimize agricultural impacts where possible, spring time construction may be avoided. However, if construction during spring is necessary, disturbance to farm soil from access to each structure location could be minimized by using the shortest access route feasible or practicable. This may require construction of temporary driveways between the roadway and the structure but could limit traffic on fields between structures. Construction mats may also be used to minimize impacts on the access paths and in construction areas.

Some landowners use GPS navigation systems on farm equipment. Once the project is complete, the transmission line poles could have GPS coordinates that Applicants may provide to the landowners to aid in navigation of farm equipment, if requested.

Tile lines may be present along the transmission line route. Applicants intend on working with the landowners to identify locations of drainage tiles along the route and intend on minimizing interference with tiling, where possible. In the event that Applicants locate a tile line that the landowner did not discuss, Applicants could relocate the pole and repair the tile line, if damaged.

Crop dusting may occur within agricultural fields along the route. If this farming practice is utilized, and has the potential to become impacted by the project, Applicants intend on working with the landowner to identify mitigative measures to avoid or reduce changes to farming practices caused by the project.

Forestry

Impacts on wooded lands have been minimized by locating the proposed routes to minimize tree clearing to the extent feasible. As a result, no mitigative measures are proposed.

Mining

The Applicant Preferred Route, Route A, and Route Options are not located within immediate proximity of any mines, nor could it otherwise have any affect on existing mining operations. Therefore, no mitigative measures are proposed.

6.8 WATER RESOURCES

This section discusses the water resources in the project area between Alexandria and Sauk Centre and the potential impacts on these resources.

6.8.1 Affected Environment

The proposed project routes cross one major water resource region (watersheds), as defined by the USGS. The proposed routes cross the Upper Mississippi Region (07) which ultimately drains into the Gulf of Mexico. Within these regions the Applicant Preferred Route crosses two smaller watersheds and Route A crosses three smaller watersheds. Table 6.8-1 and Table 6.8-2 contain a list of all the 8-digit Hydrologic Unit Codes (HUC 8) watersheds crossed by the Applicant Preferred Route and Route A and the proposed Route Options.

Table 6.8-1. Watersheds (HUC 8) Crossed by the Applicant Preferred Route and Route Options

Watershed Name	Hydrologic Unit Code
Sauk River	07010202
Long Prairie River	07010108

Table 6.8-2. Watersheds (HUC 8) Crossed by Route A

Watershed Name	Hydrologic Unit Code
Sauk River	07010202
Long Prairie River	07010108
Chippewa River	07020005

Surface Water

The project occurs within northwestern Minnesota, an area covered with several surface water resources. surface water resources are defined as both lakes and surface flows (rivers and streams) within the project area. Some surface waters are designated as Public Waters by the State of Minnesota and are under the regulatory jurisdiction of the MnDNR and are listed in the Public Waters Inventory (PWI). The statutory definition of public waters can be found in Minn. Stat. 103G.005, subdivisions 15 and 15a.

Several streams, rivers, and lakes occur within the proposed routes. The Applicant Preferred Route and associated route options cross a total of 22 intermittent surface flows, six of which

are PWI surface flows, and 12 perennial surfaces flows, 7 of which are PWI surface flows. Named PWI surface flows crossed by the Applicant Preferred Route include; the Sauk River, Ashley Creek, and Hoboken Creek. The Preferred Route also contains two PWI water bodies; Clifford and West Union.

Route A crosses a total of 35 intermittent surface flows, one of which is a PWI surface flow, and seven perennial surface flows all of which are PWI Surface Flows. Named PWI surface flows crossed by Route A include; the Sauk River, Ashley Creek, and Hoboken Creek. The Preferred Route also contains two PWI water bodies; Doebben's Marsh and Burroughs. Surface flows and lakes contained in the proposed routes are shown on detailed maps in Appendix H.

Section 303(d) of the federal CWA requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants; these are also referred to as impaired waters. The list, known as the 303(d) list, is based on violations of water quality standards. In Minnesota, the Minnesota Pollution Control Agency (MPCA) has jurisdiction over determining 303(d) waters. Several of the surface waters located within the proposed routes are on the 303(d) list. The Applicant Preferred Route crosses three impaired waters, two of which are surface flows and one lake. Route A crosses two surface flow impaired waters. Table 6.8-3 contains a list of impaired waters contained within the proposed routes, along with the causes of impairment based on the 2008 MPCA 303(d) list.

Table 6.8-3. Impaired Water Crossed or within the Route and Option Alternatives

Watercourse Name	Impairment
Applicant Preferred Route	
Ashley Creek	Dissolved Oxygen
Sauk River	Fecal Coliform, Polychlorinated Biphenyls, Turbidity, Mercury
Clifford Lake	Excessive nutrients/ Eutrophication
Route A*	
Ashley Creek	Dissolved Oxygen
Sauk River	Fecal Coliform, Polychlorinated Biphenyls, Turbidity, Mercury
Route Options	
Option 5	
Ashley Creek	Dissolved Oxygen
Option 6	
Sauk River	Fecal Coliform, Polychlorinated Biphenyls, Turbidity, Mercury

**Includes area within Option 7.*

Groundwater Resources

The state of Minnesota is divided into six groundwater provinces with varying characteristics. The majority of the Applicant Preferred Route, Route A, and the route options cross the Central Province, which is characterized by sand aquifers in generally thick sandy and clayey glacial drift

overlying Precambrian and Cretaceous bedrock. Groundwater within fractured and weathered Precambrian bedrock is used locally as a water source (MnDNR, 2001).

A query of the county well index, a computerized database containing basic well information for over 340,000 water wells drilled in Minnesota, was preformed to identify water wells that may occur within the proposed routes and route option. Table 5.8-4 summarizes the water wells located within the proposed routes. There are no wellhead protection areas (WHPA – generally areas surrounding municipal well fields that are subject to land use restrictions to protect the groundwater resource) located within this portion of the project area.

Table 6.8-4. Water Wells contained within the Proposed Routes and Route Options

Route/Option	Water Wells
Applicant Preferred Route	25
Route A*	17
Option 4	0
Option 5	0
Option 6	4

**Includes area within Option 7.*

Wetlands

The USACE maintains jurisdiction over waters of the U.S. The definition of "waters of the United States" is found in 40 Code of Federal Regulations 230.3(s). Under Section 404 of the CWA, t is anticipated that this project would be covered under Letter of Permission-05-MN (2005-825-RJA). Conditions of the Letter of Permission require the District Engineer post a notice on the District's web site. Some projects would also require notification to other agencies, including the US Fish and Wildlife Service, MN Department of Natural Resources, MN Pollution Control Agency, US Environmental Protection Agency and Coastal Zone Management. Generally, opportunity for comment lasts 30 days.

The USFWS National Wetlands Inventory (NWI) was used to identify wetlands throughout the proposed routes. Starting in the 1970s, the USFWS produced maps of wetlands based on aerial photographs and Natural Resources Conservation Service (NRCS) soil survey maps. Because land use has changed since the 1970s, wetlands shown on the NWI maps are sometimes inconsistent with current wetland conditions; however, NWIs are the most accurate and readily available database of wetland resources within the proposed project area.

For jurisdictional purposes, the USACE and the State of Minnesota jointly define wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

A total of 414 acres of wetlands occur within the Applicant Preferred Route, 49 acres of which are PWI wetlands. Seven hundred and nineteen acres of wetlands occur within Route A, 127 acres of which are PWI wetlands.

A total of 128 acres of wetlands occur within Option 4, 47 of which are PWI wetlands. A total of 36 acres of wetlands occur within Option 5, three of which are PWI wetlands. A total of 179 acres of wetlands occur within Option 6, 38 of which are PWI wetlands. Table 6.8-5 summarizes the total acreage of NWI wetlands by type that occur within the proposed routes.

Table 6.8-5. Wetland Type and Acreage within the Proposed Routes

Wetland Type	Total Acreage within Route
Applicant Preferred Route	
Freshwater Emergent	303
Freshwater Forested/Shrub Wetland	73
Freshwater Pond	8
Lake	17
Riverine	12
Route A*	
Freshwater Emergent	552
Freshwater Forested/Shrub Wetland	155
Freshwater Pond	4
Lake	8
Riverine	0
Route Options	
Option 4	
Freshwater Emergent	120
Freshwater Forested/Shrub Wetland	6
Freshwater Pond	2
Option 5	
Freshwater Emergent	26
Freshwater Forested/Shrub Wetland	7
Lake	3
Option 6	
Freshwater Emergent	174
Freshwater Forested/Shrub Wetland	4
Freshwater Pond	1

**Includes area within Option 7.*

Floodplains

Floodplains are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans and subject to geomorphic (land-shaping) and hydrologic (water flow) processes. Floodplains are

regulated at both the state and federal levels to promote and ensure sound land use development in floodplain areas.

The Federal Emergency Management Agency (FEMA) collected data and has mapped floodplains nationwide. FEMA defines a 100-year flood zone as the following: "A 100-year flood is the flood elevation that has a one percent chance of being equaled or exceeded each year. The 100-year flood is the standard used by most Federal and state agencies and is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and determination of flood insurance" (FEMA FAQ documents).

FEMA maps were reviewed to determine the presence of floodplains within the proposed routes. This search indicated that the only 100-year floodplain located within the proposed routes is Sauk River floodplain. The acreages of floodplain within the proposed routes are shown in Table 6.8-6.

Table 6.8-6. Floodplains within the Proposed Routes and Route Options

Route	Floodplain	Acres
Preferred Route*	100-Year	110
Route A	100-Year	119
Route Options		
Option 4	100-Year	0
Option 5	100-Year	28
Option 6	100-Year	119

Includes area within Option 7.

6.8.2 Potential Impacts

This section presents the potential impacts the project could have on water. A 150-foot-wide ROW was used to calculate impacts for each proposed route. The Applicant is proposing to parallel the Interstate 94 corridor for significant segments of the Applicant Preferred Route. To address the potential for conflicts with occupancy of Interstate 94 right of way, the Applicant specifically identified two alignment options for these routes, the ROW Occupancy (alignment centerline generally 25 feet outside the edge of Interstate 94 right of way) and the No ROW Occupancy (alignment centerline generally 75 feet outside the edge of Interstate 94 right of way). The 150-foot-wide ROW was also used to calculate impacts for each of the four Route Options in this area. Although the specific alignments have not been determined, the tables included below provide a qualitative assessment of the type of impacts that could occur when a final alignment has been selected.

Surface Water

Because all rivers, streams, and ditches would be spanned by transmission structures or avoided (if possible), a limited number of structures would be located within these features and impacts on rivers, streams, or ditches would be minimized. Indirect impacts could include sedimentation reaching surface waters during construction due to ground disturbance by excavation, grading,

construction traffic, and dewatering of holes drilled for transmission structures. This could temporarily degrade water quality due to turbidity.

Several surface flows would be crossed by the proposed routes. These crossings are summarized in Table 6.8-7 and Table 6.8-8.

Table 6.8-7. Potential Surface Water Impacts Route Evaluation

Alignment	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Applicant Preferred ROW Occupancy	6	11	6
Applicant Preferred No ROW Occupancy	6	11	6
Route A	6	26	6

Table 6.8-8. Potential Surface Water Impacts Options Evaluation

Alignment	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Option 4 Area			
Route A	1	4	2
Option 4	1	3	2
Option 5 Area			
Applicant Preferred ROW Occupancy	2	1	1
Applicant Preferred No ROW Occupancy	2	1	1
Option 5	2	1	1
Option 6 Area			
Applicant Preferred ROW Occupancy	2	2	2
Applicant Preferred No ROW Occupancy	2	2	2
Option 6	3	8	3
Option 7 Area			
Route A	1	3	1
Option 7	1	2	1

Surface waters are protected under section 401 of the CWA, which grants states authority to regulate discharges to surface waters. In Minnesota the MPCA is the authority over discharges to surface waters. All of the proposed routes and options would require a National Pollution Discharge Elimination System Permit (NPDES) permit from the MPCA for the discharge of stormwater generated from construction activities.

The USACE maintains jurisdiction over waters of the U.S. The definition of "waters of the United States" is found in 40 Code of Federal Regulations 230.3(s). It is anticipated that this project would be covered under the USACE 2007 Nation Wide Permit (NWP) 12 – Utility Line Activities. Conditions of NWP 12 would require preconstruction notification to the District Engineer 30 days prior to commencement of construction activities.

Groundwater Resources

All well locations within the proposed routes and route alternatives would be avoided; therefore, no impacts to groundwater resources are anticipated.

Wetlands

Temporary and permanent wetland impacts that would occur due to construction and operation of the project were determined using the NWI and PWI to estimate the acres of wetland located within 150-foot-wide ROW.

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. Permanent impacts on wetlands would take place where structures must be located within wetland boundaries. Wetland impacts due to permanent structure placement would result in approximately 55 square feet of permanent impacts per standard single-pole structure. Temporary impacts would total approximately 20-foot-wide by length of the transmission line span of the wetland, which is the assumed width of a temporary access road. Table 6.8-9 below identifies the potential wetland impacts in the area of the proposed routes and options. Appendix H illustrates the wetland locations within the proposed routes and options.

Table 6.8-9. Potential Wetland Impacts Evaluation

Alternatives	Wetlands[1] NWI							Wetlands PWI[4]		
	Total Wetlands Within the ROW (Acres)	Number of Wetlands the ROW Crosses	Forested Wetlands in ROW (Acres)	Number of Forested Wetlands ROW Crosses	Number of Poles in Wetlands[2]	Permanent Wetland Impacts (Acres)[2]	Temporary Wetland Impacts (Acres)[3]	Number of PWI Lake and Wetlands within ROW	Number of Poles in PWI Wetlands by Alignment	Permanent PWI Wetland Impacts (Acers)[2]
Route Alternatives										
Applicant Preferred ROW Occupancy	50	91	7	6	2	.002	6	8	1	.001
Applicant Preferred No ROW Occupancy	64	96	8	6	3	.003	9	8	1	.001
Route A	87	119	14	18	15	.015	10	6	3	.003
Option 4 Alternatives										
Route A	22	17	9	8	8	.008	3	0	0	0
Option 4	15	19	1	3	3	.003	2	1	1	.001
Option 5 Alternatives										
Applicant Preferred ROW Occupancy	0	6	2	1	0	0	1	0	0	0
Applicant Preferred No ROW Occupancy	5	7	3	1	0	0	1	0	0	0
Option 5	5	8	0	0	2	.003	1	0	0	0
Option 6 Alternatives										
Applicant Preferred ROW Occupancy	11	19	1	1	0	0	2	0	0	0
Applicant Preferred No ROW Occupancy	11	19	1	1	0	0	2	0	0	0
Option 6	27	30	1	2	5	.005	4	2	1	.001
Option 7 Alternatives										
Route A	2	4	2	2	0	0	0.4	0	0	0
Option 7 Area	6	7	3	2	2	.002	1	0	0	0

[1] Wetland numbers were calculated using the NWI maps. These values represent an estimate of the number of wetlands likely present along the route. These values do not necessarily represent the number of wetland impacts subject to state and federal delineation of wetlands.

[2] The number of poles was determined by preliminary pole spotting conducted by Applicants and the identification of wetlands was determined using NWI wetland data for the Applicant Preferred Route. The number of poles was calculated by taking the length of the wetland crossing and divided it by an 800 foot span. The final number of poles in wetlands is dependant on final design and engineering and field delineation of wetlands. Permanent Impacts were calculated using .001acre per pole (55 square feet per pole).

[3] Temporary impacts were calculated by identifying the acreage of wetlands that are within 10 feet of each side of the alignment (20 feet total width). The 20 feet in width is the assumed width of a temporary access road. This estimate is worst-case based as the entire length of the wetland would not likely need to be traversed during construction

[4] Stream crossings were compiled using the MnDNR 24K streams dataset. Lakes were identified using the MnDNR 24K lakes dataset. PWI streams, waters, and wetlands were identified in the MnDNR datasets. PWI waters were identified using the MnDNR PWI dataset.

As discussed previously, the USACE holds jurisdiction over waters of the U.S. Impacts to wetland areas are regulated and would comply with the conditions of NWP 12. Additionally, a license to cross PWI wetlands is required from the MnDNR. Other permits potentially needed include a Section 401 CWA, Water Quality Certification. This project may not require a permit under WCA by definition (Minn. R. 8420.0110 Subpart 18) or by exemption (R. 8420.0122

Subpart 6). Coordination with affected Local Government Units or the BWSR is required for the WCA determination.

No staging or stringing setup areas would be placed within or adjacent to water resources, to the extent feasible. The Applicant would avoid major disturbance of individual wetlands and drainage systems during construction to the extent feasible. This would be done by spanning wetlands and drainage systems, where possible. When it is not possible to span the wetland, Applicants would draw on several options during construction to minimize impacts (see mitigation discussion below).

Access roadways would be designed to minimize wetland impacts by locating the areas of roadways near the edges of wetland areas, minimizing the width of the access roadways and construction material (gravel) where possible.

Floodplains

The 150-foot-wide ROW was used in calculating impacts to FEMA 100-year floodplains for the proposed routes and options. Along with the total number of poles that would be placed in the 100-year floodplain were calculated by dividing the length of the transmission line span of the floodplain by the estimated distance between poles of 800 feet. Table 6.8-10 and Table 6.8-11 identify the potential impacts to floodplains within the proposed routes and options.

Table 6.8-10. Potential Floodplain Impact Evaluation for Route Alternatives

Alignment	Total Acreage of 100-year Floodplain	Number of Poles
Applicant Preferred ROW Occupancy	5	2
Applicant Preferred No ROW Occupancy	5	2
Route A	19	7

Table 6.8-11. Potential Floodplain Impact Evaluation for Route Options

Alignment	Total Acreage of 100-year Floodplain	Number of Poles
Option 4 Alternatives		
Route A	0	0
Option 1	0	0
Option 5 Alternatives		
Applicant Preferred ROW Occupancy	4	2
Applicant Preferred No ROW Occupancy	4	2
Option 5	4	2
Option 6 Alternatives		
Applicant Preferred ROW Occupancy	1	0
Applicant Preferred No ROW Occupancy	1	0
Option 6	19	7
Option 7 Alternatives		
Route A	0	0
Option 7	0	0

Impacts within FEMA floodplains would be limited to the poles placed within the floodplain, and are expected to be minimal. Coordination with local floodplain management departments would be required for construction of poles within FEMA 100-yr floodplains.

6.8.3 Mitigation

The following section discussed mitigation for surface waters, wetlands and floodplains.

Surface Waters

Impacts could be avoided and minimized using appropriate sediment control practices and construction practices. These practices may be detailed in the NPDES permit and Stormwater Pollution Prevention Plan (SWPPP) that could be completed prior to the start of construction. In addition, Minn. Stat. 84.415 requires the Applicant to obtain a license from the MnDNR for passage of any utility over, under, or across public waters.

The mitigation options for each of the proposed routes are the same. The applicant could minimize the impacts to waterways in several ways. The Applicant has indicated that they do not intent to cross waterways with construction equipment unless necessary. Where waterways must be crossed to string new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices could help to prevent soil erosion. There are no anticipated significant, permanent impacts on surface water quality because impacts could be minimized and mitigated, disturbed soil could be restored to previous conditions or better, and the amount of land area converted to an impervious surface is expected to be small.

Wetlands

Impacts to wetlands could be minimized through construction practices. Construction crews could maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil. Crews could avoid major disturbance of individual wetlands and drainage systems during construction. This could be accomplished by strategically locating new access roads and spanning wetlands and drainage systems where possible. When it is not feasible to span the wetland, construction crews could rely on several options during construction to minimize impacts:

- When possible, construction could be scheduled during frozen ground conditions;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route);
- The structures could be assembled on upland areas before they are brought to the site for installation; and
- When construction during winter is not possible, construction mats could be used where wetlands could be impacted; and
- Erosion control devices (e.g., silt fence, straw bales) could be installed to ensure that sediment does not enter the water feature.

Wetland vegetation could be restored following construction.

Floodplains

Impacts within FEMA floodplains are expected to be minimal and therefore no mitigation is being proposed.

6.9 NATURAL LAND RESOURCES

This section discusses the natural environment with respect to land based natural resources in the project area between Alexandria and Sauk Centre and the potential impacts on these resources. Natural Resources evaluated in this section include State Wildlife Management Areas (WMAs), Scientific Natural Areas (SNAs), National Wildlife Refuges (NWRs), Waterfowl Production Areas (WPAs), Conservation Easements, Flora, Fauna, Rare and Unique Natural Resources and Critical Habitat.

6.9.1 Affected Environment

WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses. SNAs are State managed resources. SNAs focus on the preservation of ecological diversity and provide educational and scientific research opportunities. WMAs are located throughout the area between Alexandria and Sauk Centre but there are no SNAs present.

Federally owned or managed lands that protect wildlife habitat and nesting include National Wildlife Refugees (NWRs), WPAs, and U.S. Fish and Wildlife Service (USFWS) easements. These lands are owned and managed by the USFWS to conserve important natural resources. WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. Several WPAs and USFWS easements are located throughout the area between Alexandria and Sauk Centre but there are no NWRs present.

Flora consists of the plants in the project region that make up vegetation communities and native vegetation. The Flora discussion will also present noxious weeds as regulated under Minn. Stat. Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality.

Fauna is defined as the wildlife throughout the project area and consists of birds, mammals, fish, reptiles, amphibians, mussels, and insects, both resident and migratory, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, trout streams, and riverine habitats.

Critical Habitat is the natural environment that supports species. Designated habitat or conservation areas including managed areas such as MnDNR WMAs, USFWS WPAs and easements, and unmanaged areas including MnDNR designated Minnesota County Biological Survey (MCBS) biodiversity significance and rare native habitats and communities were analyzed within each route. All of these areas provide habitat for native vegetation, wildlife, and rare and unique resources.

The MCBS identifies unmanaged areas of significant biodiversity which identify significant and rare native habitats and communities. The MCBS sites of biodiversity significance are ranked and organized into three classifications; moderate, high, and outstanding. Areas with moderate biodiversity significance contain significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery. Areas with high biodiversity significance contain sites with high quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species; the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota. MCBS sites are present in the area between Alexandria and Sauk Centre; all are moderate biodiversity sites.

Rare and Unique Natural Resources include threatened and endangered species protected under Minn. Stat. 84.895, and under Section 7 of the Endangered Species Act and areas of biodiversity significance that could be associated with rare and unique species and habitats. These resources were identified using the MnDNR Natural Heritage Information System (NHIS). Threatened and endangered species are often found within high quality rare and unique habitats and features (e.g., SNAs), which could also be identified using NHIS.

Flora

The proposed project routes occur within two Ecological Classification System (ECS) provinces, as described by the MnDNR and United States Forest Service. In this area the routes are located along the border between the Eastern Broadleaf Forest to the north and the Prairie Parkland Province to the south (MnDNR, 2010). The Applicant Preferred Route is predominantly within the Minnesota River Prairie subsection of the ECS except in two locations; one small portion east of Alexandria and the easternmost end of the route enter the Hardwood Hills subsection. Route A is entirely within the Minnesota River Prairie subsection of the ECS except at its easternmost end where enters the Hardwood Hills subsection.

The Applicant Preferred Route and Route A generally follows the prairie-forest border along the majority of its length between Alexandria and Sauk Centre. This area known as the Alexandria Moraine Complex forms the western and southern boundary of the Hardwood Hills subsection. Agriculture is the predominant present-day land use; pre-settlement vegetation included maple-basswood forests interspersed with oak savannas, tallgrass prairies, and oak forests. According to the MnDNR, wetlands and lakes in poorly-drained potholes provide opportunities for recreation or wildlife habitat. Some upland forests remain, adjacent to lakes or on steep landscapes (MnDNR, 2010). Lakes within the area attract tourism. The Minnesota River Prairie includes loamy ground moraine and some end moraines with a gently rolling topography (MnDNR, 2010). Pre-settlement vegetation was primarily tallgrass prairie and present-day land use is primarily agriculture. Thus the routes occur within a mosaic of wooded areas, open prairie, and agricultural land with many scattered lakes, streams, and wetlands.

Pre-settlement vegetation within the Minnesota River Prairie ecological classification system subclass included primarily tallgrass prairie with many prairie potholes and depressional areas consisting of wet prairie. The Minnesota River Prairie subsection would have consisted of primarily tallgrass prairie, comprised of many of the same species described previously for the Red River Prairie subsection. The Minnesota River Prairie consists of rolling topography resulting from glacial moraines.

Pre-settlement vegetation within the Hardwood Hills ECS consisted of primarily mesic oak-basswood and mesic maple-basswood forests consisting of northern red oak (*Quercus rubra*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*), with small lakes and wetlands scattered throughout the woodlands. In addition, a mosaic of savannah and open grasslands were also present throughout the western fringe of the Hardwood Hills ecological classification system subsection, along the prairie-forest border (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b). Woodlands and forests dominated sites sheltered from fire by the many lakes, rivers, and wetlands that occur throughout this area.

Noxious Weeds and Invasive Plant Species

Noxious weeds are regulated under Minn. Stat. Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality. Cropland may suffer losses in productivity following noxious weed infestations. Noxious weeds can be introduced to new areas through transporting propagating material like roots or seeds on contaminated construction equipment. Disturbed soil surfaces allow noxious weeds to become established. Eleven species of prohibited noxious

weeds are recognized and prohibited by Minnesota Administrative Rules 1505.0730. See Table 6.9-1 below. The Minnesota Noxious Weed Law also identifies 52 secondary noxious weeds. A county may select a weed or weeds from this secondary list to be placed on its noxious weeds list. If a secondary noxious weed is placed on a county noxious weed list, that weed must be controlled in that county. Applicants have indicated that they will continue to work with the state and counties crossed to identify locations along the proposed routes where invasive species may occur, and identify measures that must be taken to control these species. The potential for noxious weed impacts as associated with the proposed routes and options would be similar.

Table 6.9-1. Minnesota Prohibited Noxious Weeds

Common Name	Scientific Name
Mustard, garlic	*Alliaria petiolata*
Hemp	*Cannabis sativa*
Plumeless Thistle	*Carduus acanthoides*
Musk Thistle	*Carduus nutans*
Canada Thistle	*Cirsium arvense*
Bull Thistle	*Cirsium vulgare*
Field Bindweed	*Convolvulus arvensis*
Leafy Spurge	*Euphorbia esula*
Purple Loosestrife	*Lythrum salicaria*
Perennial Sow Thistle	*Sonchus arvensis*
Poison Ivy	*Toxicodendron radicans*

Source: Minnesota Administrative Rules. 1505.0730 PROHIBITED NOXIOUS WEEDS. Subpart 1.State prohibited noxious weed list. Available online at: https://www.revisor.mn.gov/rules/?id=1505.0730

Fauna

Common wildlife species found within the regional area include large and small mammals, songbirds, waterfowl, raptors, fish, reptiles, amphibians, mussels, and insects. Wildlife throughout the project area consists of both resident and migratory species, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, and riverine habitats. Common mammals for these habitats include raccoon (*Procyon lotor*), skunk (*Mephitis spp.*), whitetailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*), and rabbit (*Sylvilagus* spp.). Common birds include songbirds, hawks such as red-tailed hawk (*Buteo jamaicensis*) and Cooper's hawk (*Accipter cooperii*), waterfowl, and game birds such as pheasant (*Phasianus colchinus*) and turkey (*Meleagus gallopavo*). Appendix D provides lists of common mammals, birds, reptiles, and amphibians that may occur in the area.

Throughout the area between Alexandria and Sauk Centre, areas exist where high-quality wildlife habitat occurs naturally or is being managed. Designated habitat or conservation areas including managed areas such as MnDNR WMAs; USFWS WPAs and conservation easements; and

unmanaged areas including MnDNR-designated MCBS biodiversity significance and rare native habitats and communities were analyzed within the proposed routes.

While agricultural land uses are an important component of wildlife resources in the area between Alexandria and Sauk Centre, land managed to promote wildlife habitat can provide for higher species diversity and larger populations than surrounding landscapes that are intensively used for agriculture.

The Migratory Bird Treaty Act of 1918 (16 United States Code (USC) 703-712) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The Fish and Wildlife Conservation Act of 1980 (16 USC 2901-2911) affords protection to Birds of Conservation Concern. Migratory birds and Birds of Conservation Concern are an important component of biodiversity in North America. Many species are known to occur in the project area in a variety of upland and wetland habitats. Additionally, the Bald and Golden Eagle Protection Act (16 USC 668-668C), which was enacted in 1940, specifically prohibits the taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any part, nest, or egg of these eagles.

6.9.2 Potential Impacts

This section presents the impacts the project could have on land resources where potential impacts may occur.

Flora

Flora throughout most of the area between Alexandria and Sauk Centre is typical of that normally found in an agricultural setting. The majority of the Applicant Preferred Route occurs along existing rights-of-way, including roads, and is also often adjacent to cultivated row crops. Given that the vegetation communities that occur in these areas are regularly disturbed, impacts due to construction are not anticipated to substantially disrupt vegetative community quality or function. Route A does not follow major existing infrastructure and is generally along property lines or local roadways. Applicants have indicated that they would span areas containing native plant communities wherever possible or practicable. Applicants have also indicated that they would work to avoid and minimize direct impacts on habitat and conservation areas to the extent feasible.

Temporary impacts to flora would take place most intensively at the structure locations. Temporary impacts are estimated at one acre per pole. Permanent vegetative changes would take place within the right-of-way. Trees and shrubs that may interfere with maintenance and the safe operation of the transmission line would not be allowed to establish within the right-of-way. Co-locating with existing corridors through wooded areas would reduce the impact on trees and habitats they support. Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the right-of-way after construction. In addition, permanent impacts would be required at each pole location. The permanent impacts are estimated at 55 square feet per pole. Vegetation is comprised of wooded and non-wooded lands

that are not agriculture. Non-wooded lands are designated as emergent herbaceous wetlands and urban/recreation grasses and wooded lands are designated as deciduous forest, evergreen forest, mixed forest, woody wetlands by the National Land Cover Data (NLCD). Refer to Table 5.9-2. for estimated temporary impacts to vegetation for the proposed route options.

Table 6.9-2. Temporary and Permanent Impacts to Non-Agricultural Vegetation (Alexandria to Sauk Centre)

Vegetation by Route/Option	Estimated Number of Poles in Vegetated Cover	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (55 SF Per Pole) SF	Permanent Impacts (55 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	38	38	2,080	0.04
Applicant Preferred No ROW Occupancy	41	41	2,275	0.05
Route A	47	47	2,571	0.06
Option 4 Alternatives				
Route A	12	12	652	0.01
Option 4	8	8	461	0.01
Option 5 Alternatives				
Applicant Preferred ROW Occupancy	1	1	52	0
Applicant Preferred No ROW Occupancy	2	2	128	0
Option 5	1	1	64	0
Option 6 Alternatives				
Applicant Preferred ROW Occupancy	14	14	762	0.02
Applicant Preferred No ROW Occupancy	14	14	763	0.02
Option 6	17	17	944	0.02
Option 7 Alternatives				
Route A	2	2	108	0
Option 7	2	2	135	0

Source: NCLD, 2001

None of the alternatives represent major permanent impacts to vegetation.

Fauna

There is potential for the displacement of wildlife and loss of habitat from construction of the project. Wildlife 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. Additionally, these animals would be typical of those found in agricultural and urban settings and should not incur population level effects due to construction.

Habitat fragmentation could be caused by the transmission line bisecting habitats. Where the proposed transmission line follows existing features such as roads, transmission lines, or field lines, very few new corridors would be created as a result of this project. In any case, areas of sensitive habitat would be spanned as much as possible. Impacts from habitat fragmentation can extend beyond the area disturbed by a new route. Fragmentation affects some wildlife species by creating barriers to daily migrations. Predation can increase among animals that are forced out of cover as they search for food, and decreases the distance that predators may have to travel to penetrate large habitat areas. Some species depend on large areas of undisturbed habitat and their survivability decreases as fragmentation increases.

Temporary impacts on fauna would take place most intensively at the structure locations (requiring one acre per structure). Staging areas and stringing areas would also temporarily impact fauna within the project area. Grading could occur at the staging areas if they are not located in previously disturbed sites. Through right-of-way access would be limited to 20 feet in width. In forested areas, clearing would be limited to only those trees necessary to permit the passage of equipment and the area would be restored to original condition.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission line. Avian collisions are a possibility after the completion of the transmission line but the larger size of conductors associated with transmission lines compared to distribution lines would result in higher visibility, potentially decreasing collisions. Waterfowl typically are more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas and wetlands or open water that serve as resting areas. In these areas, it is likely that waterfowl and other birds would be traveling between different habitats, potentially increasing the likelihood of avian conflicts with the transmission line. Because of the high density of birds in such nesting sites, disturbance to the site has the potential to impact individuals. Species' population reproductive success is not likely to be impacted.

Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. Applicants' transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to this project.

Because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries would be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

Rare Unique Natural Resources/Critical Habitat

Through coordination with the USFWS and MnDNR, no areas of concern were identified between Alexandria and Sauk Centre. The Applicant would continue to coordinate with the USFWS and MnDNR to identify any additional areas of concern.

Rare and unique communities and habitats occur throughout the area between Fargo and St. Cloud. Rare and unique communities include federal waterfowl production areas and state WMAs, SNAs, parks, trails, and MCBS sites of biodiversity significance. Data from the USFWS,

MnDNR, and private organizations were reviewed to determine areas containing rare or unique communities and habitats within the proposed routes. Federal lands along the routes include WPAs, which are included within the NWR system and are managed by the USFWS, preserve wetlands and grasslands critical to waterfowl and other wildlife; and wetland, grassland, and Farmers Home Administration easements, which are managed by the USFWS to protect the prairie pothole community and wetlands on farmlands, respectively. State-owned lands along the routes include WMAs and easements managed by the Board of Water and Soil Resources (BWSR). In addition, the MnDNR, Division of Ecological Resources, MCBS data were reviewed to determine if there were areas with moderate, high, or outstanding biodiversity significance within the routes.

Five USFWS easements and three Minnesota County Biological Survey (MCBS) sites of biodiversity significance are crossed by the Applicant Preferred Route. No WMAs, WPAs, SNAs, MCBS Railroad Prairies, BWSR Easements, or Native Plant Communities are crossed by the Applicant Preferred Route between Alexandria and Sauk Center.

Seven USFWS easements, three WMAs, six MCBS Sites of Biodiversity Significance, two BWSR RIM Easements, and five Native Plant Communities are crossed by Route A. No WPAs, SNAs, or MCBS Railroad Prairies are crossed by Route A between Alexandria and Sauk Center.

Table 6.9-3 below identifies sensitive management areas and conservation easements within proposed routes and ROW. Table 6.9-3 below identifies sensitive management areas and conservation easements within proposed Route Options 4 and 6; Route Options 5 and 7 do not have any additional impacts on the resources presented in the table.

Table 6.9-3. Habitat Impact Evaluation for Routes

Habitat Classification	Applicant Preferred ROW Occupancy		Applicant Preferred No ROW Occupancy		Route A	
	Route (Acres)*	ROW (Acres)*	Route (Acres)*	ROW (Acres)*	Route (Acres)*	ROW (Acres)*
WPAs	0	0	0	0	0	0
WMAs	0	0	0	0	220	12
USFWS Easements						
Wetlands	63.8	6.8	63.8	6.8	73.9	3.4
Grasslands	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	13.6	0
Other	15.8	0	15.8	0	57.5	0
MCBS Sites of Biodiversity Significance						
Moderate	0	0	0	0	56	10
High	0	0	0	0	0	0
Outstanding	0	0	0	0	0	0
MCBS, Native Plant Communities	0	0	0	0	32	5
MCBS Railroad Right-of-Way Prairies						
Fair	0	0	0	0	0	0
Good	0	0	0	0	0	0
Very Good	0	0	0	0	0	0
SNAs	0	0	0	0	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0
Calcareous Ferns						
Outstanding	0	0	0	0	0	0

**Unless noted, i.e. MCBS Railroad Right-of-Way Prairies are given in length.*

Table 6.9-4. Habitat Impact Evaluation: Options 4 and 6

Habitat Classification	Option 4 Area				Option 6 Area			
	Route A		Option 4		Applicant Preferred ROW and No ROW Occupancy		Option 6	
	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)
WPAs	0	0	0	0	0	0	0	0
WMAs	0	0	0	0	0	0	0	12
USFWS Easements								
Wetlands	0	0	35.5	5.1	15.8	0	0	0
Grasslands	0	0	0	0	0	0	0	0
Farmers Home Administration	13.6	0	3.5	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
MCBS, Sites of Biodiversity Significance								
Moderate	0	0	0	0	0	0	37	6.5
High	0	0	0	0	0	0	0	0
Outstanding	0	0	0	0	0	0	0	0
MCBS, Native Plant Communities	0	0	0	0	0	0	29	5
MCBS, Railroad Right-of-Way Prairies								
Fair	0	0	0	0	0	0	0	0
Good	0	0	0	0	0	0	0	0
Very Good	0	0	0	0	0	0	0	0
SNAs	0	0	0	0	0	0	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	0	0	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0	0	0
Calcareous Ferns								
Outstanding	0	0	0	0	0	0	0	0

There are relatively few impacts to habitats by the project between Alexandria to Sauk Centre. However, the Route A alignment impacts a WMA, an MCBS Site designated as Moderate, and five native plant communities whereas the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments do not. Both the Applicant Preferred Route and Route A impact USFWS Easement classified as Wetlands and Route A includes approximately four fewer acres than the Applicant Preferred ROW Occupancy and No Occupancy alignment within its ROW. Route A impacts approximately 14 acres of a USFWS Easement classified as Farmers Home

Administration but does not include any of the easement within its proposed ROW. Finally, while a USFWS easement classified as "other" intersects both the Applicant Preferred Route and Route A, the assumed transmission line alignment within those routes does not impact the USFWS easement.

Route Option 4 includes a USFWS Easement classified as wetlands within its ROW whereas Route A does not. Both Option 4 and Route A impact a USFWS Easement classified as Farmers Home Administration but neither includes any acreage within their respective ROW.

Route Option 6 impacts a WMA, MCBS Site designated as moderate and an MCBS Native Plant community whereas the Applicant Preferred Route does not in that area. Option 6 avoids a USFWS Easement classified as wetlands that the Applicant Preferred Route impacts.

The Applicant Preferred Route impacts fewer natural resources between Alexandria and Sauk Centre than Route A. The Route Options 5 and 7 did not have any different impacts than the Applicant Preferred Route or Route A. With limited exception the Route Options 4 and 6 had very few additional impacts on resources however there were a few.

Protected Species

This section discusses species protected under Section 7 of the Endangered Species Act and Minn. Stat. 84.895. Species protected under the Endangered Species Act include those listed as federally threatened or endangered. Species protected under state statute are those listed as special concern, threatened, and endangered.

Table 6.9-5 below lists the state listed species found within one mile of the proposed routes, within the 1,000' Route corridor, and within the 150' proposed ROW for each route and option as applicable. No federally listed species have been identified within one mile of the proposed routes.

Table 6.9-5. Protected Species Occurrences Associated with the Applicant Preferred Route ROW Occupancy and No ROW Occupancy

Common Name	Scientific Name	Number of Occurrences within 1000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
Birds					
Marbled Godwit	*Limosa fedoa*	1	0	SC	S3

Table 6.9-6. Protected Species Occurrences Associated with Route A ROW Occupancy

Common Name	Scientific Name	Number of Occurrences within 1000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
Birds					
Marbled Godwit	*Limosa fedoa*	1	0	SC	S3

One state-listed threatened, endangered or candidate species were identified within the Applicant Preferred Route and Route A. The Route Options do not impact any state-listed threatened, endangered or candidate species.

None of the Route Options encompass known occurrences of protected species.

6.9.3 Mitigation

Flora

The transmission line alignment and structure locations would be determined in final design and mitigation measures may include spanning sensitive flora or vegetation. The disturbance necessary for construction may cause a reduction of habitat within the ROW for some wildlife. The effect diminishes after construction as vegetation reestablishes. If the ROW is then managed for maximum vegetation cover, there should not be a significant long-term reduction in habitat that is present under the existing line. Areas disturbed due to construction activities could be restored to pre-construction contours and reseeded with a seed mix recommended by local MnDNR management and that is certified to be free of noxious weeds.

The Applicants have indicated that they intend to continue to work with the MnDNR and USFWS to minimize and avoid impacts to properties where native vegetation occurs and is managed. The proposed routes could avoid and minimize impacts on properties where native vegetation occurs, wherever possible. When native vegetation communities cannot feasibly be spanned, Applicants intend to work to minimize the number of permanent structures that may impact the native community. Naturally managed properties disturbed during construction could be restored to pre-construction contours and could be reseeded with a seed mix recommended by agency staff or required according to required project permits. The applicant is proposing to restore disturbed land to pre-construction contours and stabilized using a seed mix specified within the project's NPDES permit requirements.

Similarly, the Applicants could continue to work with the MnDNR and USFWS to minimize and avoid impacts on sensitive flora along the route and intend to avoid and minimize impacts on any areas known to contain native vegetation, wherever possible.

Construction equipment can spread noxious weed-propagating material to new locations. Applicants intend to comply with Minnesota noxious weed laws as described in Minn. R. Ch. 1505 and intend to observe county weed lists where they occur. Around substations and switches, Applicants intend to provide for weed control in a manner that does not allow for the spread of weeds onto adjacent agricultural land during operation of the transmission line.

Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the ROW after construction.

Crews could attempt to limit ground disturbance wherever possible during the construction of the transmission line and substations. However, areas of disturbance are expected during the normal course of work, which may occur over several weeks in any one location. As construction on each parcel is completed, disturbed areas could be restored to their original

condition to the maximum extent practicable. The ROW agent could contact each property owner after construction is completed to see if any damage has occurred as a result of the project. If damage has occurred to crops, fences or the property, Applicants could reimburse the landowner for the damages sustained. In some cases, Applicants may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Resilient species of common grasses and shrubs typically reestablish areas disturbed during construction with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line route may require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences; and
- Straw bales.

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

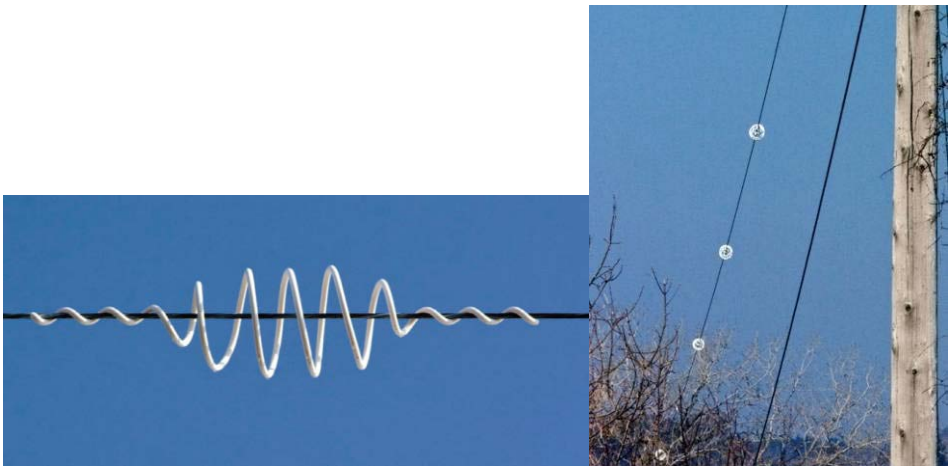
Fauna

To mitigate possible impacts on wildlife, the Applicants are proposing to span designated high quality wildlife habitat areas to the extent feasible. In areas where complete spanning is not possible, Applicants intend to minimize the number of structures placed in high quality wildlife habitat, and intend to work with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures such as leaving vegetation buffers adjacent to waterways to provide species movement, construction mats to avoid soil compaction, and reseeding. Also, Applicants have routed the Applicant Preferred Route such that the majority is co-located with the Interstate 94 corridor or other existing rights-of-way that have been previously disturbed; therefore, minimizing additional tree clearing that could increase fragmentation. Similarly, because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries would be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

According to the Applicant, avian issues at water body crossings and other areas of concern could be addressed by working with the USFWS and MnDNR to identify any areas that may require marking the proposed transmission line, such as with the use of bird flight diverters, in an effort to reduce the likelihood of collisions. In 2002, Xcel Energy entered into a voluntary Memorandum of Understanding with the USFWS to work together to address avian issues throughout its service territories. The development of Avian Protection Plans for each state the Company serves, including Minnesota, is currently underway to help support the Memorandum of Understanding. This Memorandum of Understanding has been approved by the USFWS. Additionally, to mitigate possible impacts on wildlife, the Applicant is proposing to avoid areas known as major flyways or migratory resting spots, and span designated high quality wildlife

habitat areas to the extent feasible. In areas where complete spanning is not possible, the Applicant intends to minimize the number of structures placed in high quality wildlife habitat, and is proposing to work with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures such as adding transmission line shield wires to the lines.

Diagram 6-5. Transmission Line Shield Wires



Source: CapX2020. 2009. Birds and Power Lines. CapX2020 Fact Sheets.

The Applicant is proposing to restore disturbed areas due to construction activities to pre-construction contours and is proposing to reseed with a MnDNR-recommended seed mix that is free of noxious weeds.

Rare and Unique Natural Resources/Critical Habitat

As discussed in previous sections, Applicants have routed the Applicant Preferred Route such that the majority is co-located with existing rights-of-way, therefore minimizing additional tree clearing that could increase fragmentation of sensitive habitats.

In addition, the Applicants intend to follow standard erosion control measures identified in the Minnesota Pollution Control Agency's (MPCA) Stormwater Best Management Practices Manual to maintain sound water and soil conservation practices during construction of the project to minimize soil erosion, and protect topsoil and adjacent water resources. These measures include using silt fencing, slope breaks, containing excavated material, protecting exposed soil, and stabilizing restored soil. The Applicant is proposing to implement these measures to minimize erosion and sedimentation impacts to adjacent water resources. The Applicants are proposing to complete construction according to NPDES permit requirements.

No construction activities are being proposed within or immediately adjacent to waterbodies or wetlands, to the extent feasible. Applicants are proposing to avoid major disturbance of individual wetlands and waterbodies during construction. The Applicant is proposing to span wetlands and waterbodies.

Where water resources must be crossed to string new conductors and shield wires, workers may walk across, use boats, drive equipment across ice in the winter, or use temporary bridges to cross over or through the wetland or water body. Wetland and water body boundaries along the

construction corridor could be identified and marked prior to construction to assure these sensitive areas are protected accordingly. Setbacks could be established to identify safe fueling areas and staging areas a sufficient distance from waterbodies and wetlands when possible or as required by permit conditions. These construction practices could help to prevent siltation within waterbodies and wetlands and minimize the risk of an inadvertent release of harmful fluids due to fueling and lubricating of equipment.

Avoidance and minimization could be accomplished by strategically locating new access roads outside of wetland and water body boundaries and spanning wetlands and waterbodies, where possible. When it is not feasible to span a water resource, or avoid access to the right-of-way through a wetland or water body, construction crews could rely on several options during construction to minimize impacts, including:

- When possible, construction could be scheduled during frozen ground conditions;
- When construction during winter is not possible, construction mats could be used as needed to minimize temporary impacts due to construction in a water resource;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route); and
- The structures could be assembled in upland areas before they are installed within a water resource to minimize temporary impacts due to structure installation.

Protected Species

Where possible, impacts on these species could be prevented by avoiding known locations and potentially suitable habitats during finalization of the transmission line alignment. Where structure placement and/or spanning of transmission lines cannot be avoided in suitable habitats, listed species associated with these habitats could be affected. If project activities within potentially suitable habitat cannot be avoided, surveys could be conducted and the MnDNR could be consulted to ensure impacts on listed species are avoided or minimized.

The special status species associated with wetlands, stream banks, and rivers could be impacted by placement of structures within these habitats, or by increased erosion and sedimentation that could occur if appropriate mitigative measures or Best Management Practices are not employed. Therefore, the Applicant could span rivers, streams, and wetlands throughout the project area to the extent practical, implement the appropriate mitigation measures or practices such as using construction mats to avoid soil compaction, and maintain sound water and soil conservation practices during construction of the project to protect topsoil and adjacent water resources, minimizing soil erosion and sedimentation. However, if it is not feasible to span, surveys could be conducted to determine the presence of state-listed species or suitability of habitat for such species, and coordination could occur with the appropriate agencies to avoid and minimize any associated impacts.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas would be to span all streams and rivers. Construction mats are also placed

in wet or soft soil locations and narrow ditches to minimize disturbances. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site. Diagram 5-8 shows an example of construction mats.

Diagram 6-6. Example of Construction Mats

Source: Route Permit Application for the Monticello to St. Cloud 345 kV Transmission Line Project.

6.10 AIR QUALITY

This section discusses the potential for ozone and nitrogen oxide production from transmission lines, and temporary air quality impacts associated with construction activities. In general, transmission lines and substations do not produce significant amounts of air pollutants. During construction, it is possible that fugitive dust can be created resulting from soil disturbance and released into the atmosphere. The entire project area is in attainment with National and Minnesota Ambient Air Quality Standards for all criteria pollutants.

6.10.1 Affected Environment

The affected environment is the area near the transmission line and substations, which travels through portions of Douglas, Pope, Todd, and Stearns Counties, depending on the alternative. All counties are classified as attainment areas for all criteria air pollutants (Carbon Monoxide - CO, Lead - Pb, Nitrogen Dioxide - NO_x, Particulate Matter (PM_{10} and $PM_{2.5}$), Ozone – O_3, and Sulfur Dioxide – SO_2).

Currently, ambient air monitoring data are collected for $PM_{2.5}$, O_3, and CO for one station within Stearns County. Ambient air monitoring data taken from these stations, provided in Appendix

E, show that monitored data are lower than the National Ambient Air Quality Standards found in Table 6.10-1. Other criteria pollutants are not currently monitored within the affected environment.

Table 6.10-1. National Ambient Air Quality Standards

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.	
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None	
	35 ppm (40 mg/m^3)	1-hour(1)	None	
Lead	0.15 μg/ m^3	Rolling 3-Month Average	Same as Primary	
	1.5 μg/ m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 μg/ m^3)	Annual (Arithmetic Mean)	Same as Primary	
	0.100 ppm (189 μg/ m^3)	1-hour(8)	None	
Particulate Matter (PM_{10})	150 μg/ m^3	24-hour(2)	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 μg/ m^3	Annual(3) (Arith. Mean)	Same as Primary	
	35 μg/ m^3	24-hour(4)	Same as Primary	
Ozone	0.075 ppm (2008 standard)	8-hour(5)	Same as Primary	
	0.08 ppm (1997 standard)	8-hour(6)	Same as Primary	
	0.12 ppm	1-hour(7) (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arith. Mean)	0.5 ppm	3-hour(1)
	0.14 ppm	24-hour(1)		
	0.075 ppm	1-hour(9)	0.5 ppm (1300 μg/m^3)	

Source: www.epa.gov/air/criteria.html - Information Retrieved June 25, 2010.

Notes:

[1] Not to be exceeded more than once per year.

[2] Not to be exceeded more than once per year on average over 3 years.

[3] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m^3.

[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m^3.

[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.

[6] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard (0.08 ppm) to the 2008 ozone standard (0.075 ppm). EPA is in the process of reconsidering the standards set in 2008.

[7] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact Areas. The 1-hour ozone standard does not apply to the project area.

[8] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.

[9] To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Minnesota also has established AAQS. For many pollutants and averaging periods, the MNAAQS have been made identical to NAAQS. There are subtle differences, and for some pollutants, Minnesota has a standard while no standard exists at a national level, including for hydrogen sulfide and particulate matter. While total particulate matter still has an official standard, it is enforced more loosely with a primary emphasis on standards for PM_{10} and $PM_{2.5}$). For a complete listing on MNAAQS, please visit Minnesota's Office of the Revisor of Statutes' website (https://www.revisor.mn.gov/rules/?id=7009.0080)..

Relative to the 2008 ozone standard, Minnesota Pollution Control Agency recommended to USEPA in a March 10, 2009, letter that the entire state be designated as attainment for the 2008 ozone standard. (Appendix F) EPA is in the process of reconsidering the standards set in 2008 and in January 2010 proposed to lower the 8-hour standard to somewhere between 0.060-0.070 ppm. If the standard were to be lowered to 0.060 ppm, all counties that currently monitor for ozone in Minnesota would be classified as nonattainment based on 2006-2008 data. Given that ozone is a regional pollutant by nature, it is safe to assume that any of the counties involved in this project would ultimately be classified as nonattainment for a 0.060 ppm standard based on 2006-2008 data if monitoring were established for ozone within their boundaries. If the standard were to be lowered to 0.065 or 0.070 ppm, it is unclear as to which of the non-monitored counties involved in this project, if any, would be classified as nonattainment.

The only pollutants of concern relating to transmission line operations are O_3 and NO_x. However, transmission lines and substations do not produce significant amounts of these air pollutants, as the O_3 and NO_x emissions from a 345 kV transmission line result from corona effects and are very minor.

Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors and can produce ozone and oxides of nitrogen in the air surrounding the conductor. For a 345 kV transmission line, the conductor gradient surface is usually below the air breakdown level. Typically, some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Ozone is not only produced by corona, but also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone from chemicals in the atmosphere. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short lived.

6.10.2 Potential Impacts

The impacts and mitigation would be the same for the various alternative routes, options, and substations.

There are no differences in attainment status in any of the counties along either route. The route chosen should not impact air quality in a meaningful way.

6.10.3 Mitigation

According to the Applicant, Best Management Practices (BMPs) will be used to minimize or avoid temporary impacts from fugitive dust and other construction-related emissions. These BMPs may include:

- Oil and other petroleum derivatives will not be used for dust control. Speed limits will be enforced, based on road conditions, to reduce dust problems.
- Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, will not be operated until repairs or adjustments are made.
- Burning or burying waste materials on the ROW will not be permitted and all waste materials shall be disposed at permitted waste disposal areas or landfills.
- The emission of dust into the atmosphere during construction will be minimized to the extent practical during the manufacturing, handling, and storage of concrete aggregate. Methods and equipment will be used as necessary for the collection and disposal or prevention of dust during these operations. The methods of storing and handling cement and cement additives will also include means of minimizing atmospheric discharges of dust.

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7.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION - SAUK CENTRE TO ST. CLOUD

Section 7 analyzes the human and environmental impacts associated with each route alternative between Sauk Centre and St. Cloud. Nine route alternatives are being analyzed within this area located in Stearns County, Minnesota. All routes begin east of Sauk Centre where Route A crosses the Applicant Preferred Route at I-94. Five route options and two amended scope options are also analyzed within this section. The Route D alternative includes an under grounding component which is discussed in further detail below and in the resource areas of this Section. A summary of the impacts is included in Appendix K.

In general, a 1,000-foot corridor is used to describe the affected environment for each resource (see Section 1.5 for a discussion of areas wider or narrower than the general 1,000 foot width). An assumed 150-foot ROW within the corridor is used to determine potential impacts for each route and each route option alternative. Evaluation of each route option includes a comparison to the corresponding section of the nine primary routes.

Undergrounding on Route D

In addition to analysis of the 345 kV above ground transmission line, Section 7.0 also includes impacts associated with the construction of one 345 kV High Pressure Fluid Filled (HPFF) underground cable circuit which would extend for a total of 14 miles in three separate areas along Route D (Figure 1-11). The three areas are:

- The Freeport area underground segment, which is two miles in length,
- The Albany area underground segment, which is two miles in length, and
- The Avon area, which is 10 miles in length.

A trench construction method would be used to install equipment associated with the underground transmission line, which includes a transition station at the beginning and end of each underground area. The transition station provides the equipment to move the transmission line from above ground to below ground. Trench vaults would be installed approximately every 2,000 feet along the underground segment. Duct banks containing the cables required for undergrounding would run between each of the vaults.

Diagram 7-1. Vault Installation

The predominant environmental impact from the construction, operation, and maintenance of underground transmission lines arises from the need to develop and maintain a ROW totally cleared of woody vegetation. The construction activities for an overhead line are concentrated around the line's structures, with the areas between structures left relatively undisturbed except for the removal of trees that could interfere with the energized conductors. A narrow pathway between structures is often all that is necessary to string the conductors. With underground construction, however, the entire ROW must be cleared for construction activities along the entire length of the corridor, allowing no reforestation, agricultural operations, or land uses on the area.

7.1 HUMAN SETTLEMENT

Human settlement includes the developed portion of the environment, social and economic characteristics, land use, and associated development issues that affect land use.

7.1.1 Affected Environment

The study area for affected environment is the transmission line corridor, generally 1,000 feet wide, for each proposed route alternative and surrounding area. The affected environment for Human Settlement describes the existing conditions associated with human influenced development in the area such as the current socioeconomic conditions and the general land development patterns. This section discusses these conditions within the affected counties and municipalities that would be crossed by the proposed transmission line.

Socioeconomic Resources

Stearns County will likely experience temporary minimal effects on local employment and economies from the construction and operation of the proposed project. The area where the routes cross is both rural and developed, depending on the route. Stearns County contains the largest population within the entire transmission line study area affected area due to the population center of St. Cloud and several other cities in the vicinity.

The population of the townships where the routes are located best represents the population of the affected environment since these are the smallest geographic areas for which population estimates are available. As shown in Table 7.1-1, the population of the townships which would be affected by the proposed routes was estimated in 2008 to be 84,460. Much of this area is rural, however the townships that encompass the proposed routes include the incorporated areas of Melrose, Freeport, Albany, Avon, St. Joseph, and St. Cloud. Development density increases where routes converge near these cities.

Table 7.1-1. Population Characteristics of Townships in Study Area

County	Total County 2008 Population Estimate	2008 Population within Study Area Townships and Cities	
		Total	Percent of County Population
Stearns	146,989	84,460	57

Source: U.S. Census, 2008 Population Estimates

Table 7.1-2 shows the 2000 population broken down by racial category for the townships in the study area. The population of Stearns County was approximately 96 percent white in 2000.

Table 7.1-2. 2000 Racial Characteristics of Townships in the Study Area

Location*	Population	White or Caucasian	Black or African American	American Indian	Asian	Other Races
Stearns	77,203	73,889 (95.7%)	938 (1.2%)	274 (0.3%)	1,645 (2.1%)	448 (0.6%)

**Represents population of townships within Stearns County that are affected by a route alternative.*
Source: U.S. Bureau of the Census 2008, Census 2000.

Income characteristics for the study area are presented at a county level in Table 7.1-3. Per capita personal income for Stearns County area remains below the state average, but also increased at the same rate as the state between 1998 and 2008.

Table 7.1-3. Per Capita Personal Income

Location	1998	2003	2008	% Change 1998-2008	Percentage of Individuals Below Poverty Level 2000
Stearns County	$23,358	$28,493	$34,328	11.3%	8.7
State of Minnesota	$29,273	$35,281	$42,953	11.2%	7.9

Source: Minnesota Office of the State Demographer, Income estimates, 2008: County level income data for Minnesota; U.S. Census Bureau, 2000 Census, General Demographic Characteristics.

Land Use and Zoning

The land use study area includes all land within the routes and adjacent properties. Land uses in this area include agricultural, residential, and commercial uses. Agricultural uses predominate; commercial uses are located in and adjacent to the incorporated areas where development densities are higher. Interspersed commercial and industrial uses occur along I-94 and other existing roadways. Zoning near these incorporated areas include residential, commercial, and industrial uses. Existing land use in the area is predominantly agricultural or undeveloped land; however, low density, single-family, or rural residential uses also occur. Table 7.1-4 shows the area of agricultural, residential, and commercial/industrial zoning within the routes and route options.

Table 7.1-4. Zoning Within Each Route

Route	Acres and Percentage of Zoned Land Use						
	Agriculture	Residential	Commercial/ Industrial	Municipal	Recreation	Special Agricultural	Transitional
Applicant Preferred	10,196 (91.7%)	90 (.8%)	723 (6.5%)	38 (.3%)	73 (.7%)	0 (0)	0 (0)
Route A	10,032 (93%)	89 (.8%)	649 (6%)	17 (.2%)	12 (.1%)	0 (0)	0 (0)
Route B	5,535 (97%)	87 (2%)	37 (1%)	41 (1%)	30 (1%)	0 (0)	0 (0)
Route C	4,835 (91%)	80 (1%)	281 (5%)	62 (1%)	82 (2%)	0 (0)	0 (0%)
Route D	4,233 (80%)	305 (6%)	454 (9%)	201 (4%)	72 (1%)	0 (0)	0 (0)
Route E	6,112 (92%)	122 (2%)	199 (3%)	37 (1%)	81 (1%)	0 (0)	102 (2%)
Route F	5,303 (77%)	313 (5%)	823 (12%)	40 (1%)	193 (3%)	212 (3%)	0 (0)
Route G	6,038 (94%)	79 (1%)	141 (2%)	37 (1%)	29 (0)	0 (0)	102 (2%)
Route H	5,976 (93%)	79 (1%)	128 (2%)	103 (2%)	31 (0)	0 (0)	102 (2%)
Route Options *							
Option 8	68 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Option 9	530 (89.1%)	10 (1.7%)	48 (8.1%)	6 (1.0%)	1 (0.2%)	0 (0)	0 (0)
Option 10	196 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Option 11	376 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Amended Scope Options							
Option AS-4	696 (100%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Option AS-5	167 (79.1%)	37 (17.5%)	0 (0)	7 (3.3%)	0 (0)	0 (0)	0 (0)

**Option 12 includes segments of Route B or Route E, and, therefore, was not included in the table*

Local zoning districts traversed by the Proposed Routes include mostly agricultural-related classifications although residential, commercial, and industrial zoning districts are also affected. With the exception of Route D and Route F, more than 90 percent of each route corridor is in

agricultural zoning. Route F affects a greater amount of commercial/industrial zoning than any of the other routes, with 12 percent of the route being zoned for these uses. This is reflective of its location in the business district in Cold Spring. Route F also affects more residential zoning compared to the other routes. Most of this residential land is located in the southeastern end of the corridor near Richmond, Cold Spring, and Rockville which is a more developed portion of the corridor than the western part. The entire study area is zoned by the county or city zoning jurisdictions. Stearns County administers zoning over the unincorporated area.

Displacement

Table 7.1-5 shows the number of residential and nonresidential structures within the 1,000-foot routes for each alternative. To the extent feasible, the proposed 345 kV transmission line can be designed by the Applicant so that all existing residences are located outside of the required ROW. Approximately 200 residences are located within Routes D, F, A, and B. Route C includes the smallest number of residences at 83.

Table 7.1-5. Residences and Nonresidential Structures Located Within Routes Areas

Route	Structures Within 1,000-Foot Routes and Substation Areas	
	Residences	Nonresidential Structures
Applicant Preferred	165	409
Route A	190	470
Route B	190	223
Route C	83	146
Route D	220	210
Route E	91	279
Route F	218	141
Route G	98	251
Route H	99	249

Table 7.1-6. Residences and Nonresidential Structures Located Within Route Option Areas

Option	Structures Within 1,000-Foot Routes and Substation Areas	
	Residences	Nonresidential Structures
Route Options *		
Option 8	0	0
Option 9	7	3
Option 10	0	0
Option 11	4	1
Amended Scope Options		
Option AS-4	5	26
Option AS-5	2	3

**Option 12 includes segments of Route B or Route E, and, therefore, was not included in the table*

Pipelines

There are four pipelines that occur in this portion of the project. A short segment of a Minnegasco pipeline runs in a northwest to southeast direction from Melrose to Freeport and transports gas. Two Northern Natural Gas pipelines exist in this portion of the project that also transport gas. One of the Northern Natural Gas pipelines runs in a northwest to southeast direction in the middle of this portion of the project. The other Northern Natural Gas pipeline is in the southern area of this portion of the project and runs in a southwest to northeast direction. An Amoco pipeline runs in a northwest to southeast direction through the middle of this portion of project and transports liquid. (See Appendix H).

Noise

Noise is defined as unwanted sound. Noise may include a variety of sounds of different intensities across the entire frequency spectrum. Noise is measured in units of decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dBA) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dBA. A noise level change of three dBA is barely perceptible to average human hearing. A five dBA change in noise level, however, is clearly noticeable. A ten dBA change in noise levels is perceived as a doubling or halving of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Cumulative noise increases occur on a logarithmic scale. If a noise source is doubled, there is a three dBA increase in noise, which is barely discernible to the human ear. For cumulative increases resulting from sources of different magnitudes, the rule of thumb is that if there is a difference of greater than ten dBA between noise sources, there will be no additive effect (*i.e.*, only the louder source will be heard and the quieter source will not contribute to noise levels). Therefore, predicted noise levels associated with the transmission line are typically much lower than the ambient noise in the project area and will not increase the existing background noise levels in the project area. Table 5.1-6 provides noise levels associated with common, everyday sources and places the magnitude of noise levels discussed here in context.

Table 7.1-7. Noise Levels Associated with Common Sources

Sound Pressure Level (dBA)	Noise Source
140	Jet engine (at 25 meters)
130	Jet aircraft (at 100 meters)
120	Concert
110	Pneumatic chipper (powered by compressed air or hydraulics)
100	Jointer/planer
90	Chainsaw
80	Heavy truck traffic
70	Business office
60	Conversational speech
50	Library
40	Bedroom
30	Secluded woods
20	Whisper

Source: A Guide to Noise Control in Minnesota, MPCA (revised, 1999)

The Minnesota Pollution Control Agency (MPCA) has established standards for the regulation of noise levels. The land use activities associated with residential, commercial, and industrial land have been grouped together into Noise Area Classifications (NAC). (Minn. R. 7030.0050). Each NAC is then assigned both daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) limits for land use activities within the NAC. (Minn. R. 7030.0040). Table 5.1-7 shows the MPCA daytime and nighttime limits in dBA for each NAC. The limits are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent (30 minutes) of the time within an hour, while L_{10} is the dBA that may be exceeded 10 percent (six minutes) of the time within an hour. Residences, which are typically considered sensitive to noise, are classified as NAC 1.

Table 7.1-8. MPCA Noise Limits by Noise Area Classification (dBA)

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

7.1.2 Potential Impacts

Potential impacts to resources were quantified within a 150-foot ROW developed for the routes and a 60-foot ROW for the underground alternatives. This section includes a discussion of impacts associated with Socioeconomic resources, Land Use and Zoning, Displacement, Property Values, Pipelines, and Noise. Quantities of potentially impacted resources, typically measured by the number of features or acreage affected within a ROW, were compared among the route alternatives and options to determine the range of effects to the resource.

Socioeconomics

The construction and operation of the transmission lines is expected to have a minimal short-term influence on the local (county and municipal) economies. In terms of payroll earnings and construction expenditures, the economic benefit from the Project could be small relative to the regional economy of St. Cloud which is the center of economic activity for this section of the corridor study area. The construction, operation, and maintenance of the substations and transmission line are not anticipated to negatively impact socioeconomic resources in the study area.

Immediate short-term positive economic gains would likely result from activities associated with construction of the proposed project, although the construction and operation of the transmission line is expected to have limited influence on the local economy. The counties within the project area may see a small boost in economic benefit due to payroll earnings, employment opportunities, and construction expenditures. Long-term beneficial impacts from the project would include incremental increases in revenues from utility property taxes, which are based on the value of the facilities. Taxes would be paid based on compliance with all applicable Minnesota and county statutes and regulations. Additionally, landowners could receive compensation for the rights to build, operate, and maintain the transmission facilities within the easement area. However, these long-term benefits are anticipated to be minor, compared to the regional economy.

Local businesses such as ready-mix concrete and gravel suppliers, hardware stores, welding and machine shops, packaging and postal services, and heavy equipment repair and maintenance service providers may also benefit from the Project's construction. Local businesses would likely see an increase in revenues from construction, and the number of workers hired from within and outside the Project area may result in positive economic gains in the form of increased wages and spending, lodging, meals, and other consumer goods and services. Construction crews would likely require temporary housing, which may include apartment rentals, hotels, motels, or campgrounds. These types of housing are abundant in and around St. Cloud and the smaller municipalities in the area.

Land Use and Zoning

The construction and operation of a transmission line can impact existing and planned land uses and local zoning through the conversion of existing land use to transmission line ROW. Within the route alternatives, the majority of land is used for agriculture or is zoned for agricultural use. Therefore this land use type would be most likely to be affected by the Project. However, these impacts are anticipated to be limited to pole locations, and the majority of the transmission line ROW could continue to be used for agricultural purposes.

Zoning within each route is illustrative of the type of land use that could be impacted by the ultimate 150-foot transmission line alignment. Quantitative data on specific alignments is provided in Table 7.1-9 and Table 7.1-10 for the all the routes and the route options within the Sauk Centre to St. Cloud study area. The alignments associated with the Applicant Preferred Route consider occupancy of Interstate 94 ROW. The ROW Occupancy alignment proposes an

alignment within 25 feet of the I-94 ROW and the no ROW occupancy alignment proposes no overlap of transmission line ROW.

Table 7.1-9. Route Right-of-Way Impact Evaluation for Land Use: Route Alternatives

Route	Acres						
	Agriculture	Residential	Commercial /Industrial	Municipal	Recreation	Special Ag.	Transitional
Applicant Preferred ROW Occupancy	533	6	25	3	5	0	0
Applicant Preferred No ROW Occupancy	813	9	33	4	7	0	0
Route A	831	3	30	1	0.3	0	0
Route B	812	14	7	6	0.3	0	0
Route C	649	19	34	10	5	0	0
Route D	527	57	64	30	6	0	0
Route E	768	10	4	4	1	0	10
Route F	696	41	120	5	11	32	0
Route G	781	9	3	4	0.05	0	10
Route H	782	9	3	13	0	0	10

Agricultural zoning and land use would be affected the most by all of the proposed routes shown in Table 7.1-9. The primary difference among the routes is the amount of developed land uses that would be affected. Routes C, D, and F are located within several municipalities and therefore cross more urban zoning and land uses than the remaining routes which primarily affect rural areas. Greater effects to residential and commercial/industrial zoning and land use would occur with these three routes mainly due to their proximity to the municipalities in this study area. Route D follows Interstate 94, crossing through the edges of Freeport, Albany, and Avon. As a result Route D affects the least amount of agricultural land among all the routes.

Effects from either route on planned land uses as identified in the future land use plans for each affected jurisdiction would vary. According to the 2003 comprehensive plan for the city of St. Cloud, the Preferred Route would not affect areas identified as primary growth areas, secondary growth areas, or ultimate service areas.

Land use impacts associated with the optional and underground segments are shown in Table 7.1-10. The largest differentiator among the options is within Option 9 where the optional segment affects over twice as much agricultural zoning and land use, and area overall, compared to the corridor occupancy options. Within Option 12, the Route B segments would affect a small amount of residential and commercial/industrial zoning and land use compared to the Route E option where only agricultural land is affected. For the Amended scope Alternatives,

AS-5 would affect less overall acreage compared to the Option 12 segment; however AS-5 would affect 11 acres of residential zoning as opposed to zero with the optional segment.

Table 7.1-10. Route Option Evaluation for Land Use: Options and Undergrounding Areas

Option	Acres						
	Agriculture	Residential	Commercial /Industrial	Municipal	Recreation	Special Ag.	Transitional
Option 8							
Applicant Preferred	15	1	0	0	0	0	0
Option 8	9	3	0	0	0	0	
Option 9							
Applicant Preferred ROW Occupancy	21	0	0	3	0	0	0
Applicant Preferred No ROW Occupancy	32	0	0	4	0	0	0
Option 9	78	2	7	0	0	0	0
Option 10							
Route A	25	0	0	0	0	0	0
Option 10	27	0	0	0	0	0	0
Option 11							
Route E	57	0	0	0	0	0	0
Option 11	53	0	0	0	0	11	0
Option 12							
Route B	18	10	4	0	0	0	0
Route E	22	0	0	0	0	0	0
Amended Scope Options							
Route D/E*	40	0	0	0	0	0	0
Option AS-5	29	11	0	0.75	0	0	0
Underground Options							
Route D Undergrounding Freeport	2.0	2.3	1.3	1.4	0	0	0
Route D Above Ground Freeport	7.5	4.6	2.9	5.0	0	0	0
Route D Undergrounding Albany	0	0	11.0	0	2.3	0	0
Route D Above Ground Albany	0	0	28.5	0	5.0	0	0
Route D Undergrounding Avon	54.8	8.9	4.6	5.7	0.4	0	0
Route D Above Ground Avon	139.4	24.2	2.9	15.2	1.3	0	0

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Because the underground option ROW width is only 60 feet compared to the above ground 150 feet ROW, less land uses and zoned land would be impacted by the portions of Route D that are proposed for undergrounding. For each of the three sections, the undergrounding options would impact between approximately 60 to 65 percent less zoned land than the above ground segments. Both the undergrounding and above ground options would prohibit any developed land uses within the easement; however agricultural land uses would still be allowed within the 150-foot ROW of the above ground options. The most prominent differences between the underground and above ground options occur in the commercial area through Albany along I-94 and the agricultural land affected in the Avon area.

Existing land uses in proximity to any of the routes are not expected to change as a result of construction and operation of the proposed transmission line. In agricultural areas, the majority of land underneath the transmission lines could still be used for agricultural purposes. However, an average of 55 square feet of land would be permanently impacted at each pole location.

Displacement

Displacement of residences and commercial or industrial properties can occur when the transmission line ROW cannot avoid such structures. In such a situation, the property and the structures on it are acquired, and the occupant(s) of the structures are relocated to a new residence or business location. No likely displacement locations within the proposed ROWs were identified. Other nonresidential buildings are also located within the transmission line routes which include commercial buildings and residential accessory structures.

Table 7.1-11 shows the number of residential and nonresidential structures within 500 feet of the proposed ROW centerline for each route.

Table 7.1-11. Route Right-of-Way Impact Evaluation for Displacements: Routes

Route	Residences within Proximity of Alignment (Feet)				
	0-75	75-150	150-300	300-500	Total within 500
Applicant Preferred ROW Occupancy	0	8	46	29	83
Applicant Preferred No ROW Occupancy	0	8	46	28	82
Route A	0	21	57	38	116
Route B	0	30	106	55	191
Route C	1	9	41	26	77
Route D	9	20	75	75	179
Route E	0	12	37	27	76
Route F	1	9	97	99	206
Route G	0	9	49	30	88
Route H	0	10	57	29	96

For all Routes except Routes C, D, and F there are no residences within 75 feet of the ROW centerline. One residence is located within 75 feet of Routes C and F, and nine residences are located within the ROW area of Route D. Although several residences are located in the proposed ROW being evaluated for this EIS, to the extent feasible, the proposed 345 kV transmission line could be designed so that all existing residences are located outside of the required ROW. The largest number of homes within 500 feet of the ROW centerline among all the routes would be experienced on Routes B, D, and F which would impact between 179 and 206 residences.

Table 7.1-12 shows the number of residences within 500 feet of the proposed ROW centerline for each route option and the underground alternatives. No residences are located with 75 feet of the ROW centerline for the options with the exception of Option 12E where one residence would be affected.

A 60-foot ROW was considered for analysis of the underground options; therefore, a 30-foot distance from the centerline was calculated as a comparison to the corresponding ROW impacts for the above ground segments of Route D. Several residences would be affected under both scenarios, however due to the more narrow ROW width of the underground section; fewer residences would be located within the ROW compared to the above ground section. This is not the case in the Albany section where both cross sections would affect one residence. However, in the Freeport section, one residence would be located in the above ground ROW compared to none in the underground section. In the Avon section, nine residences would be located in the above ground ROW compared to zero in the underground section.

Table 7.1-12. Route Option Evaluation for Displacements: Option Areas

Option	Residences within Proximity of Alignment (Feet)*				
	0-75	75-150	150-300	300-500	Total within 500
Option 8					
Applicant Preferred Route	0	0	0	0	0
Option 8	0	0	0	0	0
Option 9					
Applicant Preferred ROW Occupancy	0	0	1	2	3
Applicant Preferred No ROW Occupancy	0	0	1	2	3
Option 9	0	1	3	3	7
Option 10					
Route A	0	0	1	0	1
Option 10	0	0	0	0	0
Option 11					
Route E	0	1	7	3	11
Option 11	0	1	2	1	4
Option 12					
Route B	0	0	2	1	3
Route E	0	0	0	0	0
Amended Scope Options					
Route D/E *	1	11	0	0	0
Option AS-5	0	0	2	2	4
Underground Options*					
Route D Undergrounding Freeport*	0	0	1	21	22
Route D Above Ground Freeport	1	0	4	17	22
Route D Undergrounding Albany*	1	0	0	3	4
Route D Above Ground Albany	1	0	1	2	4
Route D Undergrounding Avon*	0	1	21	76	98
Route D Above Ground Avon	5	10	43	40	98

**Proximity of residences to the undergrounding sections were measured at 0-30 feet, 30 to 60 feet, 60 to 180 feet and 180 to 500 feet to be consistent with the ROW proximity proportions for the above ground alternatives.*

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Property Values

Concerns regarding potential effects to property values for parcels of land crossed by the alternative routes were voiced by members of the public during project scoping. A number of research studies have been conducted on the effect of HVTL and other energy facilities on residential properties. A literature review was conducted to determine if conclusive impact assessments can be made. These studies included appraiser studies, attitudinal studies, and

statistical analyses. None of the studies reviewed during this research provided conclusive findings which could isolate the impacts of transmission lines on property values.

Property values for parcels of land crossed by or adjacent to the proposed transmission line are not anticipated to significantly change. Literature reviews indicate that although value losses up to 20 percent have been reported (EPRI, 2003), study results are highly dependent on methodology and location. Numerous studies have found that property values in parcels neighboring transmission lines are more dependent on traditional assessment categories, such as location, house size, and amenities, rather than the presence of a transmission line. Impacts are the greatest for agricultural lands where the transmission lines interfere with cultivating paths and spraying practices, high-end vacation properties, and small homesteads. Loss of value for residential parcels results from concern about health and visual impacts. However, impacts typically diminish within 10 years of transmission line construction. Positive impacts to property values can occur when transmission line ROWs are allowed to be cultivated or developed into recreational areas (Cowger, 1996 and Wisconsin Public Service Commission, 2000).

Several of the studies reviewed indicated that property value losses have been experienced, but decreases in property values are typically minor and the amount of decrease is dependent on the unique circumstances of the each property. A literature review and statistical analysis conducted in 2008 reviewed a number of studies conducted between 1984 and 2007 and evaluated the effect on property values from HVTL in Connecticut and Massachusetts (Voorvaart and Chalmers, 2008). The study concluded that there is no evidence of effects on residential real estate values due to either proximity or visibility of HVTL.

Based on the research conducted, it is not anticipated that the proposed transmission line routes evaluated would significantly affect the value of properties adjacent to the proposed transmission lines.

Pipelines

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

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

Capacity effects are typically only a concern during pipeline construction when long sections of the pipeline are above ground. To prevent contact shock hazards, proper horizontal and vertical

separation between the transmission line's conductors and equipment used during pipeline construction and maintenance (such as cranes and shovels) must be maintained.

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

One of the Northern Natural Gas pipelines crosses Route F in the Richmond area and also crosses the Applicant Preferred Route and Routes E and B near the St. Cloud. This pipeline does not cross any of the route options. The Amoco pipeline crosses Routes H, G, F, and E as it travels in a northwest to southeast direction across this portion of the project. This pipeline does not cross any of the route options. The other Northern Natural Gas pipeline and the segment of the Minnegasco pipeline do not cross any of the routes or route options. None of these pipelines exist in the areas where undergrounding is being considered (See Appendix H).

Noise

Construction activities would generate noise that is short-term and intermittent. Construction activities would be limited to daytime hours classified by the MPCA as between 7AM and 10PM. As such, the project would not have significant noise effects for the surrounding area.

Temporary construction noise resulting from underground sections of the transmission line may be loud enough to create temporary noise impacts at receptors with the NAC-1 category.

Typical construction of these underground sections consists of a "cut and cap" procedure. A cut is made with backhoe and front end loaders to the depth needed to place concrete substructures and as these substructures are finished, the cut is capped with class 5 backfill and then graded and seeded.

This process is repeated throughout the length of the underground sections. Typically, underground transmission line construction proceeds at a rate of approximately 100 feet per day Noise from cutting will be noticeable to receptors within 500 feet however; it is not expected to be a long term noise impact. Neither North Dakota nor Minnesota regulates short term construction noise impacts; however, communication between the construction team and residents will serve to inform and alleviate noise concerns over the short term.

Once the underground sections are capped and graded, there is no apparent noise produced by these installations, therefore there will be no long term noise impact associated with the completed underground sections.

Transmission lines produce noise under certain conditions. The level of noise depends on conductor conditions, voltage level, and weather conditions. Generally, activity-related noise levels during the operation and maintenance of transmission lines are minimal and do not exceed MPCA noise standards outside of the right-of-way.

In foggy, damp, or rainy weather, transmission lines can create a crackling sound due to the small amount of electricity ionizing the moist air near the conductors. During heavy rain the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, transmission lines will produce audible noise approximately equal to household background levels.

The proposed transmission lines were modeled using referenced noise values and with a 3dB reduction per doubling of distance to simulate divergence due to distance from a line source. Where possible, the model was executed as a worst-case scenario benchmark, to ensure that noise was not under-predicted. Table 7.1-13 presents the L_5 and L_{50} predicted for proposed transmission lines for the project. The L_5 is a noise level that will not be exceeded more than five percent of the time. Using the L_5 for demonstrating compliance with the MPCA L_{10} standard is conservative because the noise level exceeded 10 percent of the time will be less than noise level exceeded five percent of the time.

Table 7.1-13. Calculated Audible Noise for the Operation of Proposed Single/Double Circuit Transmission Line Designs (Receptor 3.28 Feet above Ground)

Structure Type	Noise L_5 (Edge of ROW 75 feet, Estimated Ambient + dBA increase)	Noise L_{50} (Edge of ROW, dBA)
Steel Mono-Pole 345 kV/345 kV Double Circuit	48.5	45.5

With the 75-foot set-back distance determined to be the buffer within which coronal noise may be audible, each of the proposed routes and options were analyzed to determine if any residential receptors were affected.

Residences residing within 1,000 feet of the routes would fall within the NAC 1 category under Minn. Rules. As such, the L10 and L50 from the project must not exceed nighttime levels of 55 and 50 dBA at these residences, respectively. Since it is assumed that the noise levels generated by the project will be the same at night as those generated during the daytime, compliance with the nighttime levels which are more restrictive will also demonstrate compliance with the daytime noise standards due to greater noise sensitivity of humans at night.

Noise associated with the operation of the proposed 345 kV transmission line along the routes is not predicted to exceed the noise limits identified by the MPCA at any of the adjacent the residential receptors.

Each underground section would require an above ground transition station at each end of its 2000 foot section. The transition stations contain above ground and exposed transformers which create low frequency noise (60 hertz) noise in the form of a hum. This hum can be apparent to receptors within 200 feet of the transition stations but is rarely loud enough past 500 feet to be apparent over the ambient noise. Below is a discussion of each underground section and the associated transition station.

The Freeport area would include approximately 2 miles of underground transmission line. Two transition stations would be required, one at each end of the 2 mile area. There are no residences defined as NAC-1 within 500 feet of either transition station, therefore there are no long term noise impacts expected.

The Albany area would include approximately 2 miles of underground transmission line. Two transition stations would be required one at each end of the 2 mile area. There are no residences defined as NAC-1 within 500 feet of either transition station, therefore there are no long term noise impacts expected

The Avon area would include approximately 10 miles of underground transmission line. Two transition stations would be required one at each end of the 10 mile area. There is one residence defined as NAC-1 within 500 feet of the eastern most transition station. While there may be an audible hum noticeable from this transition station at this residence, it may only be apparent during the quietest times at over-night. At this time it is not known what noise level this transition station may generate; however based on industry information it appears, at, it is unlikely that it will produce enough noise to be above the MPCA noise guideline.

7.1.3 Mitigation

This section includes a discussion of potential mitigation for impacts to Socioeconomic resources, Land Use and Zoning, Displacement, Property Values, Pipelines and Noise.

Land Use

The Applicant would purchase ROW easements for private property crossed by the transmission line in accordance with state and federal land acquisition requirements. In addition, the transmission line alignment could be designed to avoid structures to the extent practical. No additional mitigative measures are necessary relative to land use.

Displacement

Landowners would be compensated for easements and parcel acquisitions for the project. As described, no residential displacements are anticipated, and nonresidential structure displacements are unlikely. If avoidance cannot be achieved, landowners would be relocated and compensated for all easements and parcel acquisitions.

Property Values

Based on the research conducted it is anticipated that there could be limited impacts on the values of residential properties adjacent to the transmission line, however, the displacement section above indicates that there will be few residential properties in proximity to the line.

Pipelines

With proper planning and mitigation, pipelines and high voltage AC transmission lines can be safely collocated. The AC interference effects can be predicted with computer modeling. The National Association of Corrosion Engineers has standards that ensure that pipeline integrity would not be degraded nor personnel safety compromised because of AC interference from a transmission line constructed and operated adjacent to a pipeline. Mitigation techniques for AC interference on pipelines include reducing the impedance of the transmission structure grounds,

grounding the pipeline in conjunction with de-couplers, burying gradient control wires along the pipeline or burying ground mats under aboveground facilities (such as valves) and using dead fronts at test stations.

None of these mitigation methods are expected to require additional ROW. Reducing transmission impedance consists of adding stacked or parallel ground rods to the structure grounding system. This is done adjacent to the transmission structure, thus no additional transmission line ROW is required. Grounding a pipeline typically occurs within the existing pipeline through a de-coupler device to prevent DC cathodic protection current from flowing to the ground. Gradient control wires are typically copper conductors buried parallel to and adjacent to the pipeline (within 5 to 10 feet).

Ground mats consist of an eight-foot-square section of conductors buried underneath where pipeline personnel stand when operating a valve. Dead fronts consist of replacing the existing test sections with test sections that are non-conductive and require no additional land. Lastly, additional "coupon stations" are sometimes installed to monitor the pipeline to insure that mitigative measures are effective at preventing AC pipeline corrosion. These facilities are installed adjacent to the pipeline and use coupons that are exposed to the same environment as the pipeline and are monitored to determine if AC corrosion is occurring. This typically would not require additional ROW.

The Applicants could insure that computer modeling of AC interference effects is completed and that any required mitigation is designed and installed prior to energizing the transmission line. Based on past projects, the cost to complete computer modeling, mitigation design, and installation is low compared to the overall cost of the project. The Applicants have been meeting and working with all known pipeline owners to ensure there is adequate separation between the proposed transmission line and pipelines.

Noise

There are no anticipated noise impacts expected, with the exception of noise generated at the eastern end of the underground segment in the Albany area.

There is one resident located within 500 feet of the eastern end transition station in Albany. If impacts are measured during the most stringent MPCA noise guideline time frame (L_{10}, 55 dBA "nighttime" 10PM-7AM) in this area, mitigation in the form of a noise barrier at the transition station should lower the noise level at the receptor significantly to alleviate any apparent noise or impact.

7.2 PUBLIC HEALTH AND SAFETY

This section summarizes the potential impacts of the proposed transmission line and substations on health and safety, specifically electromagnetic fields (EMF), stray voltage, and health effects. EMF, as it relates to transmission lines, is addressed as two separate fields; electric fields and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line. The intensity of the magnetic field is related to the current flow through the conductors.

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Concerns related to health effects from EMF are also discussed in this section, including potential impacts to implantable medical devices (IMDs).

7.2.1 Affected Environment

The affected environment for public health and safety includes design and construction of the project, farming operations, vehicle use, and metal buildings near power lines, public and emergency services, electromagnetic fields, stray voltage, and implantable medical devices in the region in which the proposed project will exist.

Electromagnetic fields

This section discusses EMF and stray voltage with respect to the proposed project. The term EMF refers to electric and magnetic fields that arise from the electrical potential (voltage) and the movement of an electrical charge (current) associated with the transmission and use of electricity. Electric and magnetic fields are invisible just like radio, television, and cellular phone signals, all of which are part of the electromagnetic spectrum. The frequency of transmission line EMF in the United States is 60 hertz and falls in the extremely low frequency (ELF) range of the electromagnetic spectrum (any frequency below 300 hertz). For the lower frequencies associated with power lines, the electric and magnetic fields are typically evaluated separately. The intensity of the electric field is related to the voltage of the line, while the intensity of the magnetic field is related to the current flow along the conductors.

Concerns about health effects of EMF from power lines were first raised in the late 1970s. Since then, considerable research has been conducted to determine if exposure to magnetic fields, such as those from high-voltage power lines, causes biological responses and health effects. Initial epidemiological studies done in the late 1970s showed a weak correlation between surrogate indicators of magnetic field exposure (such as wiring codes or distance from roads) and increased rates of childhood leukemia. (Wertheimer et. al, 1979). More recent studies that used direct measurements of magnetic field exposure show either a very weak, or no statistical correlation with adverse health affects, e.g., Savitz, et. al. 1988; and toxicological and laboratory studies have not identified a biological mechanism between ELF-EMF and cancer or other adverse health effects.

While there are numerous internet sites devoted to EMF dangers (whether from power lines, cell phones, or radio frequency signals), the vast majority of experts believe that EMF from power lines does not cause leukemia or any other health problem. In part, these experts argue the physical impossibility of any health effect due to such low-frequency, low-energy magnetic fields.

Natural and human-made electromagnetic fields are, in fact, present everywhere in the environment. Natural electric fields in the atmosphere range from background static levels of 10 to 120 volts per meter (V/m) to well over several kilovolts per meter (kV/m) produced by the

build-up of electric charges in thunderstorms. The earth itself has a magnetic field that ranges from approximately 300 to 700 milligauss (mG). In addition to the presence of the earth's steady state electric field, an average home experiences additional magnetic fields of 0.5 mG to 4 mG which arise from the general wiring and appliances located in a typical home (National Cancer Institute, 2009).

Electric fields

Electric fields are created by voltage or the difference in the electric charge between two points, and are measured in V/m or kV/m. Higher voltage produces stronger electric fields. The intensity of the electric field decreases significantly with increasing distance from the source and electric fields are easily shielded or weakened by objects such as trees, buildings, clothing, and skin.

The available data for exposure to static electric fields suggest that the only negative human health effects are the direct perception of body hair movement and small shocks, similar to the shock received by the induced friction from walking on a carpet and touching a doorknob. On the whole, scientific evidence indicates that chronic exposure to electric fields at or below levels traditionally established for safety does not cause adverse health effects. Safety concerns related to electric fields are sufficiently addressed by adherence to the NESC.

There are currently no federal guidelines on the strength of electrical fields beneath high voltage transmission lines. However, a few states and agencies have established regulations or guidelines with regard to transmission line electric fields.

Table 7.2-1. Transmission Line Electric Field State Guidelines

State	Electrical Fields	
	On ROW	Edge of ROW
Florida	8 kV/m[a]	2 kV/m
Minnesota	8 kV/m	
Montana	7 kV/m	1 kV/m[d]
New Jersey		3 kV/m
New York	11.8 kV/m 11 kV/m[e] 7 kV/m[c]	1.6 kV/m
Oregon	9 kV/m	

[a] *For lines of 69-230 kV*
[b] *For 500 kV line*
[c] *Maximum for highway crossings*
[d] *May be waived by the landowner*
[e] *Maximum for private road crossings*

The 8 kV/m guideline used by the Minnesota Public Utilities Commission (Commission) is designed to prevent injury from shocks when touching large objects such as a bus or agricultural equipment parked under high-voltage transmission lines of 345 kV or greater. A route permit for a high-voltage transmission line typically states the line shall be designed, constructed, and

operated in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m.

Table 7.2-2. Electric Field Exposure Guidelines

Organization	Electric Field Exposure Guidelines (kV/m)	
	General Public	Occupational
ICNIRP (2009)	4.2	8.3
IEEE (2002)	5	20
ACGIH (2009)	_	25

ICNIRP – International Commission on Non-Ionizing Radiation Protection
IEEE – Institute of Electrical Engineers and Electronic Engineers
ACGIH – American Conference of Governmental Industrial Hygienists

Magnetic Fields

Magnetic fields are created by electric current or flow (measured in amperes). Higher currents produce stronger magnetic fields. However, unlike electric fields, magnetic fields are not easily shielded and pass through most structures or objects. Consequently health concerns regarding EMF have focused more closely on magnetic fields than electric fields.

People encounter magnetic fields from every-day things such as radar and microwave towers, television and computer screens, motors, fluorescent lights, microwave ovens, cell phones, electric blankets, house wiring and hundreds of other common electrical devices. As with electric fields, magnetic fields decrease in strength with increased distance from the source. The strength of both the electric and magnetic fields from transmission lines is inversely proportional to the square of the distance from the source conductors. Magnetic fields also vary in intensity depending on the type of structure and the amount of current flowing through the transmission line in a given area.

There are currently no state or federal guidelines for magnetic fields generated by high-voltage transmission lines. However, several agencies have established exposure guidelines for general public and occupational magnetic field exposure.

Table 7.2-3. States with their Own Magnetic Field Regulations

State	Magnetic Field at Edge of ROW
Florida	150 mG[a] (max load) 200 mG[b] (max load) 250 mG[c] (max load)
New York	250 mG[c] (max load)

a For lines of 69-230 kV
b For 500 kV lines
c For 500 kV lines in certain existing ROW

Table 7.2-4 below outlines Magnetic Field Exposure Guidelines established by the International Commission on Non-Ionizing Radiation Protection (INIRP), the Institute of Electrical

Engineers and Electronic Engineers (IEEE) and the American Conference of Governmental Industrial Hygienists (ACGIH).

Table 7.2-4. Magnetic Field Exposure Guidelines

Organization	Magnetic Field Exposure Guidelines (mG)	
	General Public	Occupational
ICNIRP (2009)	833	4,200
IEEE (2002)	9040	27,100
ACGIH (2009)	_	10,000

Stray Voltage

Stray voltage is a natural phenomenon that occurs between two contact points in any animal confinement area where electricity is grounded. By code, electrical systems, including farm systems and utility distribution systems, must be grounded to the earth to ensure continuous safety and reliability. Stray voltage is a condition that can occur on the electric service entrances to structures from distribution lines—not transmission lines. More precisely, stray voltage exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors. Where the electrical system is grounded, some current inevitably flows through the ground and a low level of voltage called neutral-to-earth voltage (NEV) develops at these locations. When NEV is measured between two objects that may be simultaneously contacted by an animal, it is frequently referred to as stray voltage. Stray voltage is not electrocution, ground current, EMFs, or earth current. Transmission lines have been shown to contribute to stray voltage when the electric distribution system directly serving the farm or wiring of the farm was directly under and parallel to the transmission line. These circumstances are considered and generally avoided during installation of transmission lines therefore mitigating the contribution of stray voltage from the project.

Health Effects

The study of cancer in relation to ELF EMF has been a topic of study since the late 1970s. Since that time there have been several epidemiological studies that have explored the possible association of not only cancer risks, but other potential human maladies (brain tumors, leukemia, breast cancer, and mental health issues). Studies have focused on both occupational exposures for individuals working in electrical industries and public exposures for children and adults living and working around common EMF sources (in-home wiring, transmission lines, home, and office appliances/equipment). The results of the various studies conducted over the last three decades, specifically those regarding the relationship between EMF and childhood leukemia and other cancer risks, have been mixed; some have found an association while others have not.

Where there is association suggested in epidemiological studies, it is usually very near the statistical threshold of significance. However, when these studies are repeated in a laboratory, the results have not reproduced or identified a biological mechanism to support a link between childhood leukemia and magnetic fields. The replication of field results in a laboratory setting is

a basic test of scientific validity. Researchers continue to look at magnetic fields until more certain conclusion can be reached.

The World Health Organization (WHO), in 1996, launched a large multidisciplinary research effort to address growing public concerns over the possible health effects from exposure to EMF. Based on in-depth review of scientific literature the WHO concluded that, "…current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research." Leukemia is the most common childhood cancer worldwide for children ages zero to 14, with approximately 2,600 cases diagnosed in the United States annually.

The cause of childhood leukemia is not known. Many suspected risk factors that have been studied and evaluated, but ultimately most children with leukemia do not have any risk factors, and as stated above, the cause of their cancer is not known at this time. In the case of high-voltage power lines as a suspected risk factor, the WHO indicates that few children have time-averaged exposures to residential 60 hertz magnetic fields in excess of the levels suspected to be associated with an increased incidence of childhood leukemia. Approximately 1 to 4 percent have mean exposures above 3 mG and only 1 to 2 percent have median exposures in excess of 4 mG. If there are any health risks, such as childhood leukemia, associated with living near power lines, then it is clear those risks are very small, otherwise we should be witnessing an observable epidemic of childhood cancers. However, there is little, if any evidence of such an epidemic of childhood cancer.

Implantable medical devices (IMDs) are those that are intended to be completely or partially introduced into the human body, indefinitely. Common IMDs include: pacemakers, implantable cardioverter defibrillators (ICDs), neurostimulators, cochlear implants, and insulin pumps. Interference with the operation of pacemakers and implantable cardioverters/defibrillators is a potential impact of electric fields. Interference with IMDs can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction. Modern bipolar devices are much less susceptible to interactions with electric fields.

7.2.2 Potential Impacts

The following section discusses potential impacts from electric and magnetic fields.

Electric Fields

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, which is in close proximity to the transmission line. HVTLs can induce a voltage on objects and therefore make it possible for current to flow as the object is discharged. The voltage buildup is dependent on many factors, including the weather; object shape, size, orientation, and capacitance; object to ground resistance; and location along the ROW. 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 might 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. It is important to note that underground transmission lines still generate electric fields that are detectable above the ground surface.

The main concern with induced voltage on an object is the discharge through the person to ground if contact is made with the object. The best method to avoid these discharges is to avoid parking equipment directly under the transmission line. To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes (ma). Based on Applicants' 115 kilovolts (kV), 230 kV, and 345 kV transmission line operating experience, the discharge from any large mobile object—such as a bus, truck, or farm machinery— parked under or adjacent to the transmission line are less than 5 ma and would unlikely reach levels considered an annoyance.

Similarly, the Commission's standard of maximum electric field limit of 8 kV/m measured one meter above ground was designed to prevent serious hazard from shocks when touching large objects placed under AC transmission lines of 500 kV or greater. The proposed facilities would comply with the NESC and Commission standards.

Table 7.2-5 provides electric fields at the maximum conductor voltage for the type of transmission line facilities proposed. Electric fields were calculated using ENVIRO, a software program licensed by the EPRI. The calculated electric field assumed the maximum operating voltage of 362 kV, which is 105 percent of the nominal voltage for the transmission line. For any specific design, the set of phase conductors' height above ground has a marked influence on the maximum electric field. The phasing arrangement is of particular importance for the maximum field for a double circuit configuration (two circuits on a single structure).

Table 7.2-5. Predicted Electrical Fields (kV/m) for Proposed Double Circuit 345 kV Transmission Line Designs (3.28 Feet above Ground)

Structure Type	Nominal Voltage (kV)	Distance to Proposed Centerline											
		-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'
Single Pole Davit Arm 345kV Single Circuit Delta Config	362	0.05	0.12	0.65	1.15	2.02	2.56	2.32	4.34	2.28	0.99	0.52	0.11
Single Pole Davit Arm 345kV Single Circuit Vertical Config	362	0.08	0.16	0.21	0.31	1.50	4.27	3.81	1.22	0.19	0.14	0.19	0.12
Single Pole Davit Arm 345kV/345kV Double Circuit with One Circuit In Service	362	0.04	0.08	0.11	0.05	0.22	1.16	3.76	4.30	1.58	0.40	0.18	0.12
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	362	0.02	0.05	0.15	0.42	1.41	3.46	2.48	3.46	1.41	0.42	0.15	0.05

The predicted electric field strengths range from 2.35 kV/m to 3.76 kV/m at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 7.2-4 and the Commission's maximum safety limit of 8 kV/m.

Insulated electric fences used in livestock operations can pick up an induced charge from transmission lines. Usually, the induced charge would drain off when the charger unit is connected to the fence. When the charger is disconnected, either for maintenance or for when the fence is being built, shocks may result.

Farm equipment, passenger vehicles, and trucks may be safely used under and near power lines. The power lines would be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields, and grazing lands specified by the NESC.

Buildings are permitted near transmission lines, but are generally prohibited within the ROW itself because a structure under a transmission line may interfere with safe operation. For example, a fire in a building located in the ROW could damage a transmission line.

If the transmission line were undergrounded the electric fields produced by the electric voltage would not be a concern, because they are completely contained with in the transmission cable by the insulation shield.

Magnetic Fields

Table 7.2-6 provides calculated magnetic fields for each structure and conductor configuration proposed for the project. Magnetic fields were calculated for each section of the project under two system conditions; the expected peak and average current flows as projected for the year 2011, under normal system intact conditions. Current is given in amperes (amps). The peak magnetic field values are calculated at a point directly under the transmission line and where the conductor is closest to the ground. The same method is used to calculate the magnetic field at varying distances from the alignment of the structure. The magnetic field profile data show that magnetic field levels decrease rapidly (inverse square of the distance from source) from the alignment.

Because the magnetic field produced by the transmission line is dependent on the current flowing on its conductors, the actual magnetic field when the project is in service is typically less than that shown in the table. This is because the calculations in the tables represent the magnetic field with current flow at expected normal system peak conditions. Actual current flow on the transmission line would vary as magnetic field changes throughout the day and would be less than peak levels during most hours of the year.

Table 7.2-6. Calculated Magnetic Fields (milligauss) for proposed double circuit 345 kV Transmission Line Designs (3.28 feet above ground)

Structure Type	System Condition	Current (Amps)	Distance to Proposed Centerline												
			-300'	-200'	-100'	-75'	-50'	-25'	0'	25'	50'	75'	100'	200'	300'
Single Pole Davit Arm 345kV Single Circuit Delta Config	Peak	264	0.79	1.67	5.62	8.70	14.36	23.45	31.89	29.76	17.92	10.19	6.26	1.65	0.72
	Average	158	0.47	1.00	3.36	5.21	8.60	14.03	19.08	17.81	10.73	6.10	3.75	0.99	0.43
Single Pole Davit Arm 345kV Single Circuit Vertical Config	Peak	264	0.86	1.97	7.12	11.10	18.17	27.45	25.55	16.04	9.86	6.41	4.42	1.48	0.71
	Average	158	0.52	1.18	4.26	6.65	10.87	16.43	15.29	9.60	5.90	3.84	2.64	0.88	0.42
Single Pole Davit Arm 345kV/345 kV Double Circuit with One Circuit In Service	Peak	264	0.71	1.48	4.43	6.43	9.89	16.09	25.62	27.50	18.18	11.10	7.11	1.97	0.86
	Average	158	0.43	0.89	2.65	3.85	5.92	9.63	15.33	16.46	10.88	6.64	4.25	1.18	0.52
Single Pole Davit Arm 345kV/ 345kV Double Circuit with Both Circuits In Service	Peak	264	0.19	0.58	3.32	6.08	11.96	22.90	30.03	23.06	12.10	6.17	3.39	0.59	0.19
	Average	158	0.11	0.35	1.99	3.64	7.16	13.71	17.97	13.80	7.24	3.70	2.03	0.35	0.12

Four different structure configurations are presented to show how the fields change with phasing of the circuit(s). A typical single pole single circuit line in a delta configuration has two phases on one side and one on the other; the vertical distance between phases being equal and horizontal distance from the centerline being equal as well. A single pole single circuit vertical configuration has all three phase above one another on the same side of the pole at equal vertical and horizontal distances; the center phase is sometime offset 2 to 4 feet in the horizontal direction due to ice unloading. The single pole double circuit is configured similar to the vertical configuration, but with a circuit on both sides of the pole. So, if only one circuit is installed initially it would be close to vertical configuration. Changing the orientation of the phases on the different structures will change the fields as well.

Predicted magnetic field strengths range from 15.29 to 31.89 milligauss at the mid-point of the proposed line. These levels are considerably less than the recommended exposure guidelines listed in Table 7.2-2.

Although the line would be built with double circuit capable poles, only a single circuit would be installed for this project. Electric and magnetic fields are lower for a double circuit configuration than for a single circuit configuration. The lower predicted values for a double circuit configuration results from a cancellation effect when two circuits on a single structure are designed to operate under opposite phases. Based on the proposed design and operation of the project, no impacts are anticipated due to EMF.

If the transmission line were undergrounded the magnetic fields produced by the flow of electric current will not be shielded from the ground. The magnetic field can be the greatest directly above the circuit and will diminish as the distance increases away from the circuit. The calculated magnetic field at a meter directly above the underground transmission line is expected to be approximately 8.4 mG. The calculated magnetic field at 15 feet away from the underground transmission line is expected to diminish to approximately 2.3 mG. The magnetic field can actually be higher than those from an overhead line due to the close proximity to the energized circuit.

Stray Voltage

The primary concern with stray voltage has been its potential effect on farm animals that are confined in areas where electrical distribution systems supply the farm. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. However, transmission lines can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Electrical current flowing between the neutral wire and ground is a normal part of electrical systems. Stray voltage problems are most often the result of the system not operating properly. This abnormal condition leading to stray voltage can be caused by poor grounding conditions, inadequate connections, lightening strikes, or undersized neutral conductors. Issues with stray voltage can also arise in circumstances where transmission lines are directly over or parallel to the electric distribution system serving the farm. Stray voltage can cause impacts to dairy farming operations and milk production. Issues are typically related to the distribution and service lines directly serving a farm or wiring on a farm. Issues with stray voltage can arise in circumstances

where transmission lines are directly over or parallel to the electric distribution system serving the farm.

If the transmission line were undergrounded there would be no stray voltage because the electric fields are completely contained with in the transmission cable by the insulation shield

Health Effects

Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/ defibrillators, have indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices (Wisconsin PSC, 2008),

Older unipolar designs are more susceptible to electric field interference. Research completed by Toivonen et al. (1991) indicated that the earliest evidence of interference was in electric fields ranging from 1.2 to 1.7 kV/meter. For older style unipolar designs, the electric field for some proposed structure types does exceed levels that Toivonen et al. has indicated may produce interference. However, a recent paper (Scholten et al., 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event a pacemaker is impacted, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker returns to its normal operation when the person moves away from the source of the interference.

There are typically no electric fields from underground power lines, so there should be no effects unless the magnetic fields are a problem because they are generally higher directly over an underground transmission circuit compared to being under an overhead installation. The magnetic fields tend to decrease more rapidly with distance from the underground circuit compared to overhead.

There would be no anticipated permanent impacts on implantable medical devices as a result of the project.

7.2.3 Mitigation

The following discusses mitigation for EMF, stray voltage, and health effects.

Electromagnetic Fields

There are no anticipated impacts attributed to EMF from the project, therefore, mitigation would not be needed. However, three primary methods to reduce EMF exposure for the project are explained below.

Magnetic field exposure is directly related to distance from the transmission line, therefore, as indicated in the route permit application, the applicants have selected route options and designs in part to avoid residences to the greatest possible extent. Also, the proposed ROW and the structures can be designed to help minimize EMF exposure.

Applicants would also assure that any fixed object, such as a fence or other large permanent conductive object in close proximity to or parallel to the transmission line, would be grounded so any discharge would be less than the 5 ma NESC limit.

The configuration and distance between transmission line phases has an impact on EMF exposure. The amount of EMF exposure is reduced when the phases are compacted. The applicants could consider compacted structure designs where feasible.

Phase cancellation significantly reduces EMF from transmission lines. For the double-circuit lines, rearranging phase conductors may help to reduce magnetic field strength. The applicants could consider these options during the detailed project design phase.

Stray Voltage

Mitigation of potential stray voltage impacts would include that all safety requirements are met during the construction and operation of the project. Appropriate measures could be taken to prevent stray voltage problems when the transmission lines proposed in this project parallel or cross distribution lines. Where possible, such crossings or parallel alignments would be avoided.

Health Effects

There are no anticipated health effects or impacts expected from the project, including implantable medical devices, therefore, mitigation would not be needed.

7.3 RECREATION AND AESTHETIC RESOURCES

This section discusses recreation and aesthetics resources in the Project area between Sauk Centre and St. Cloud and the potential impacts on these resources (See Appendix H). Aesthetic resources are the various elements of the landscape that contribute to the visual character of a place. The visual context of a setting is related to both the natural and built environment. Transmission lines alter this context. Recreational resources in the project area between Sauk Centre and St. Cloud include: Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), a State Forest, lakes, rivers, local and regional trails, a local and county park, golf courses, and other recreational uses.

7.3.1 Affected Environment

The following section discusses the affected environment for recreational land use, trail, scenic byways, and aesthetics.

Recreation Land

Recreational uses occurring within or adjacent to the proposed routes and options include: Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), a State Forest, lakes, rivers, local and regional trails, a local and county park, golf courses, and other recreational uses. Many of the lakes in the area provide boat access and fishing. The Sauk River has carry-in access for non-motorized boaters. Waysides associated with popular lakes provide recreational opportunities.

There are no federal or state parks in the project routes. The Spring Hill Stearns County Park is an 82-acre park traversed by one mile of the Sauk River in the project area. The park is located seven miles south of New Munich and five miles northwest of St. Martin off CSAH 12. Park amenities include a shelter, horseshoe pits, play area, carry-in boat access, primitive camping, snowmobiling trail, natural areas, and prairie remnant and restoration sites.

WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. State WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses.

Lands generally grouped as recreational use areas, which would otherwise include local parks and open space, occur within the counties and incorporated communities affected by the proposed routes. Table 7.3-1 shows the area of parks, open space, and recreation land within each route and option.

Table 7.3-1. Recreational Land Use Within Each Route and Route Option Alternative Route

Route/Option	Parks/Open Space/Recreation within proposed Route (Acres)
Route Alternatives	
Applicant Preferred Route	73
Route A	12
Route B	30
Route C	82
Route D	72
Route E	81
Route F	193
Route G	29
Route H	31
Route Options	
Option 8	
Applicant Preferred Route *	0
Option 8	0
Option 9	
Applicant Preferred ROW Occupancy	10
Applicant Preferred No ROW Occupancy	10
Option 9	1
Option 10	
Route A	0
Option 10	0
Option 11	
Route E	0
Option 11	0
Option 12	
Route E	0
Route B Segments	12
Amended Scope Options	
Route D/E*	12
Option AS-4	0
Option AS-5	0

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Applicant Preferred Route does not parallel Interstate 94 at this location; therefore there are no ROW Occupancy or No ROW occupancy alternatives.

Trails

The Lake Wobegon Trail is a significant regional trail in the project area. The Lake Wobegon Trail is a 46-mile long, regional trail that extends from the Central Lakes Trail in Osakis to St. Joseph. The trails generally parallel Interstate 94 to the north. The Glacial Lakes State Trail is a multi-use non-motorized trail in Stearns and Kandiyohi Counties. According to the MnDNR, the Glacial Lakes State Trail is located on a former Burlington Northern Railroad grade and is a popular tourist destination because of the many lakes in the area. Further, towns located along the trail provide access points, rest stops and other services to trail users (MnDNR, 2010b) Refer to Appendix H for maps of recreational resources.

Scenic Byways

The Great River Road designated scenic byway travels through St. Cloud but is located more than a mile from the project routes and options. Diagram 7-2 shows the general location of the Great River Road; refer to Appendix H for a more detailed view of the project area in relation to the Great River Road.

Diagram 7-2. Great River Road

http://minnesotascenicbyways.com/greatRiverRoad.html

Aesthetics

The topography in the Project area is flat to rolling terrain, while there are many small lakes in the area, there are still fewer lakes in this segment than the Fargo to Alexandria segment. The regional landscape is characterized by undulating and rolling plain with drumlins and mix of woodland, row crops, and pasture from Sauk Centre to around Avon where undulating sandy plain with wetlands, some lakes, small grains, row crops, woodlands, and suburban development characterize the area from near St. Cloud and eastward from the Mississippi River (EPA, 2007). Land uses associated with the routes are dominated by agricultural uses, characterizing the regional setting as mostly rural around dispersed population centers.

Recreational uses occurring within or adjacent to the proposed routes and options include: Waterfowl Production Areas (WPAs), Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), a State Forest, lakes, rivers, local and regional trails, a local and county park, golf courses, and other recreational uses. Visitors of these various recreational use areas may view the transmission line.

Open space, recreational areas, and other non-private sensitive management areas or areas generally hosting various types of conservation provide for a variety of viewing areas along the routes. Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the Project, or would otherwise be visually exposed to the Project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

Residential uses occurring within and along the routes include dispersed rural residential uses and residential uses occurring within or near incorporated communities. Residences having an unobstructed line of sight of the proposed 345 kV electrical transmission line would view the line. The distance between these residences and the line would also dictate the field of view, for example, a foreground or background view.

Portions of all of the routes follow existing transportation and utility rights-of-way (in accordance with Minn. R. 7850.4100), both generally considered pre-disturbed in nature, for most of its length. Motorists along any roadways paralleled by a route would view the transmission line. Although traffic volumes are typically highest when associated with major roads such as Interstate 94, U.S. highways, and state highways, motorist views may be considered more intermittent in that these roadways typically do not support local traffic. Local secondary roads, of which the routes generally parallel, support motorists who use these roads more regularly or repeatedly. Additionally, while the Interstate 94 corridor itself is a pre-disturbed right-of-way that is regularly maintained, Mn/DOT has obtained scenic easements at various locations along Interstate 94.

7.3.2 Potential Impacts

This section presents the potential impacts the project could have on recreation resources and aesthetics. Further, if impacts may occur, potential mitigation is discussed. The proposed routes and options cover an expansive area, approximately 20 miles wide from north to south, between

Sauk Centre and St. Cloud. There are no Wild and Scenic River Districts, federal or state parks in the proposed routes. The number of trail crossings by each route and ROW were identified. Wayside rest areas, golf courses, and other recreational resources within each route and ROW were identified and are presented in the discussion for each route and option as applicable below. WPAs, WMAs, and scenic byways were analyzed to determine if they were present within one mile proposed routes and are presented in the discussion for each route and option as applicable below. Impacts to WPAs and WMAs within the proposed route and ROW for each alternative and option, if applicable, are presented in Section 7.8 Natural Land Resources.

Recreation Land

Impact to recreation resources from the proposed routes and options are presented below. Three of the options do not have any additional impacts on recreational resources. Option 8, an alternate to the Applicant Preferred Route south of Melrose, does not impact any additional recreational resources. Option 11, an alternate to Route E, and Option 12, which provides connection options to the Quarry Substation, do not impact any additional recreational resources.

Tables 7.3-2 and 7.3-3 show the amount of recreational land use that would be impacted by the routes and the route options.

Table 7.3-2. Recreational Land Use Within Each Route and Route Option Alternative ROW

Route/Option	Parks/Open Space/Recreation within proposed ROW (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	7
Applicant Preferred No ROW Occupancy	7
Route A	0.3
Route B	0.3
Route C	5
Route D	6
Route E	1
Route F	11
Route G	0.05
Route H	0
Route Options	
Option 8	
Applicant Preferred *	0
Option 8	0
Option 9	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 9	0
Option 10	
Route A	0
Option 10	0

Route/Option	Parks/Open Space/Recreation within proposed ROW (Acres)
Option 11	
Route E	0
Option 11	0
Option 12	
Route E	0
Route B Segments	0
Amended Scope Options	
Route D/E*	0
Option AS-4	0
Option AS-5	0
Undergrounding Options	
Route D Undergrounding Freeport	0
Route D Above Ground	0
Route D Undergrounding Albany	2.3
Route D Above Ground	5.0
Route D Undergrounding Avon	0.4
Route D Above Ground	1.3

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

At this location there is no ROW Occupancy or No ROW Occupancy opportunity because it deviates from Interstate 94.

Applicant Preferred Route

One WPA, one WMA, and one SNA are within one mile of the Applicant Preferred Route from Sauk Centre to St. Cloud. Additionally, the St. Wendel Tamarack Bog SNA is one of the top two sites for Significant Biological Diversity in Stearns County and is a large wetland complex, which encompasses one of the largest remaining blocks of native vegetation in the county. This SNA supports the best and largest example of Minerotrophic Tamarack Swamp in central Minnesota. The SNA is approximately one mile west of the Applicant Preferred Route and is not impacted by the alignment. The Applicant Preferred Route crosses the Sauk River twice, which has carry-in access for non-motorized boaters. East of Albany, the route is adjacent to Pine Lake and Pelican Lake, both of which have boat access.

Route A

Four WPAs, one WMA, and one State Forest are within one mile of Route A from Sauk Centre to St. Cloud. Route A includes the Lake Sylvia Wayside, is a small recreational area with picnicking, a fishing pier, and boat launch located on the north side of CSAH 17, approximately five miles northeast of Melrose. Route A crosses the Sauk River which has multiple carry-in access points for non-motorized boaters. Like the Applicant Preferred Route the St. Wendel Tamarack Bog SNA is approximately one mile west of the Applicant Preferred Route and is not impacted by the alignment.

Route B

Route B is similar to Route A where it travels east from Sauk Centre to Holdingford. Four WPAs, one WMA, one SNA, and one State Forest are within one mile of Route B from Sauk Centre to St. Cloud. Route B includes the Lake Sylvia Wayside, a small recreational area with picnicking, a fishing pier, and boat launch located on the north side of CSAH 17 approximately five miles northeast of Melrose. Route B also crosses the Sauk River which has multiple carry-in access points for non-motorized boaters.

Route C

Route C is similar to the Applicant Preferred Route between Sauk Centre and Avon. One WPA, one WMA, and one SNA are within one mile of Route C from Sauk Centre to St. Cloud. Route C crosses the Sauk River, which has carry-in access for non-motorized boaters. East of Albany, the route is adjacent to Pine Lake and Pelican Lake, both of which have boat access. Where the Route parallels Interstate 94 it travels through the Collegeville (St. John's) Game Refuge which is a large refuge open to firearms deer and bear hunting during the established seasons, by written permission of the landowner.

Route D

Route D is similar to the Applicant Preferred Route from Sauk Centre to Freeport. One WPA, one WMA, and two SNAs are within one mile of Route D from Sauk Centre to St. Cloud. Route D crosses the Sauk River twice, which has carry-in access for non-motorized boaters. The Albany Golf Club Golf Course is within Route D on the north side of Interstate94.

There are two wayside rest areas along the route. The Big Spunk Lake wayside rest area is on the eastbound side of Interstate94 and the Middle Spunk Lake wayside rest area is located on the westbound side of Interstate94. The wayside rest areas include public amenities, play areas, interpretive signage, and picnicking opportunities. Both lakes have boat access and Middle Spunk Lake has a fishing pier. While they are in the proposed route, the alignment travels to the south of the areas.

Route D Undergrounding

The undergrounding option near Freeport is not located within one mile of any WPAs, WMAs, or SNAs and would not impact any additional recreational resources.

The undergrounding option near Albany is not located within one mile of any WPAs, WMAs, or SNAs and would not impact any additional recreational resources.

The undergrounding option west of Avon is parallel to the south side of Interstate 94 which is less than 200 feet from Big (Upper) Spunk Lake. The undergrounding option begins less than 300 feet east of the Big Spunk Lake wayside rest area is on the eastbound side of Interstate94. A transition station for this undergrounding option could be visible from the rest area. The wayside rest area includes public amenities, play areas, interpretive signage, and picnicking opportunities. There is a boat access for the lake nearby. South of Avon the undergrounding option ROW is less than 20 feet from Minnie Lake, a small lake located adjacent to CSAH 9. West of St. Joseph, where the option is parallel to the Lake Wobegon Trail, a small portion

travels through the Collegeville (St. John's) Game Refuge which is a large refuge open to firearms deer and bear hunting during the established seasons, by written permission of the landowner.

Route E

Route E is similar to the Applicant Preferred Route from Sauk Centre to Freeport. Five WPAs and two WMAs are within one mile of Route E from Sauk Centre to St. Cloud. The route turns south at Freeport and traverses an area with several small lakes. South of Albany several lakes are within the proposed route. Route E crosses the Sauk River twice, which has multiple carry-in access points for non-motorized boaters.

Route F

Route F is similar to Route E from Sauk Centre to south of Albany where it takes a major diversion south to form an outer southern loop around the other proposed routes through Richmond, Cold Spring, and Rockville before looping into St. Cloud. Three WPAs, three WMAs, and one SNA are within one mile of Route F from Sauk Centre to St. Cloud. The Sauk River, which has carry-in boat access, is crossed by Route F three times. The route is adjacent to the Sauk River Horseshoe Chain of Lakes, includes 14 lakes, and is a popular fishing and vacation destination. Becker Lake has motorized boat access south of Richmond. A baseball diamond is located within the route in Richmond between County Road 23 and 1st Street. The Richmond Community Park is less than one mile south of the route on Thein Lake. The Rick Spring Golf Club Golf Course is south of County Road 23 between Richmond and Cold Spring and is located within Route F. A boat launch and fishing pier are inside the route where the Sauk River meets Knaus Lake in Cold Spring. There are two golf courses in Cold Spring that are within one mile of Route F. The River Oaks Golf Course is north of County Road 23 and the City View Golf Course is south of County Road 23.

Route G

Route G is similar to the Applicant Preferred Route between Sauk Centre and Freeport and like Route E turns south at Freeport. Seven WPAs and two WMAs are within one mile of Route G from Sauk Centre to St. Cloud. North of St. Martin, Route G turns east to parallel the Sauk River. Route E also crosses the Sauk River twice which has multiple carry-in access points for non-motorized boaters. The Spring Hill County Park is less than a mile south of the route.

Route H

Route H is similar to the Applicant Preferred Route as it travels through Melrose. Six WPAs and two WMAs are within one mile of Route H from Sauk Centre to St. Cloud. Approximately two miles east of Melrose, County Road 237/12 intersects Interstate94. At this location Route H turns south towards New Munich. South of New Munich, the Route follows County Road 12 and parallels the Sauk River, portions of which are within the proposed route. North of St. Martin, Route G turns east to parallel the Sauk River. Route H also crosses the Sauk River twice which has multiple carry-in access points for non-motorized boaters. Like Route G, the Spring Hill County Park is less than a mile south of Route H.

Trails

Impacts to trails from the proposed routes and options are discussed below.

Applicant Preferred Route

The Applicant Preferred Route crosses several local snowmobile and multi-use non-motorized Stearns County Trails. The Applicant Preferred Route crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County Trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. It then crosses the Lake Wobegon Trail on the west side of Freeport. The Applicant Preferred Route crosses a north/south oriented Stearns County trail that travels through Freeport. Southeast of St. Anthony, the Applicant Preferred Route crosses a Stearns County Trail that connects St. Anthony to Albany. The route also parallels an east/west segment of a Stearns County Trail on 380th Street for approximately one mile. Additionally, in the same area, the route crosses another segment of the Lake Wobegon Trail that extends northeast from Albany towards Two River Lake. Where the route begins to turn south to connect into St. Cloud, it crosses a Stearns County trail between St. Joseph and Sartell.

Option 9

Option 9 diverges from the Applicant Preferred Route between Melrose and Freeport and travels parallel to Interstate94 to the north. The option crosses over the Lake Wobegon Trail and parallels it for approximately four miles just outside of the proposed ROW before tying back into the Applicant Preferred Route. In this same area the Applicant Preferred ROW Occupancy and No ROW Occupancy alternatives would cross a Stearns County trail that is parallel to County Road 237. Trail. This option would apply to Routes A and B and would have a greater impact on recreational resources because it would require an additional crossing of the Lake Wobegon Trail.

Route A

Route A crosses several local snowmobile and multi-use non-motorized Stearns County Trails. A Stearns County Trail that travels north from Melrose to Lake Sylvia parallels CSAH 17 and Route A for a little over two miles. North of St Rosa, Route A crosses a north/south segment of a Stearns County Trail. West of St. Rosa, Route A travels along CSAH 17 and is parallel to an east/west segment of a Stearns County Trail. South of Holdingford, Route A crosses a portion of the Lake Wobegon Trail and the South Branch of Two River. East of Holdingford, Route A turns south and crosses an east/west oriented segment of a Stearns County Trail that travels to St. Stephen. Route A crosses one additional Stearns County trail that travels between St. Joseph and Sartell.

Option 10

Option 10, an alternative segment to Route A and Route B crosses a north/south oriented segment of a Stearns County Trail north of St. Rosa, which would have the same impact as Route A.

Route B

Route B crosses several local snowmobile and multi-use non-motorized Stearns County trails including one that travels north from Melrose to Lake Sylvia and parallels CSAH 17 and Route B for a little over two miles. North of St Rosa, Route B crosses a north/south segment of a Stearns County Trail. West of St. Rosa, Route B travels along CSAH 17 and is parallel to an east/west segment of a Stearns County trail. South of Holdingford, Route B crosses a portion of the Lake Wobegon Trail. Where Route B transitions southward it crosses a Stearns County trail that travels to St. Stephen. The route crosses another Stearns County trail that connects St. Joseph to Cold Spring where the route begins to parallels Interstate 94.

Route C

Route C is similar to the Applicant Preferred Route between Sauk Centre and Avon. Route C crosses several local snowmobile and multi-use non-motorized Stearns County Trails. Route C crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. It then crosses the Lake Wobegon Trail on the west side of Freeport. Route C crosses a north/south oriented Stearns County trail that travels through Freeport. Southeast of St. Anthony, Route C crosses a Stearns County trail that connects St. Anthony to Albany. The route also parallels an east/west segment of a Stearns County trail on 380th Street for approximately one mile. Additionally, in the same area, the route crosses another segment of the Lake Wobegon Trail that extends northeast from Albany towards Two River Lake. Route C crosses the Lake Wobegon Trail again, east of Avon.

Route D

Generally, Route D is located in a built environment following the Interstate94 corridor for the majority of its length. Route D is similar to the Applicant Preferred Route from Sauk Centre to Freeport. Route D crosses several local snowmobile and multi-use non-motorized Stearns County trails. Route D crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County Trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. Route D crosses a north/south oriented Stearns County trail that extends through Freeport. The Lake Wobegon Trail is within the proposed ROW where it travels along the westbound side of Interstate 94 between Freeport and Albany for approximately five miles. Route D crosses a Stearns County trail that extends across Interstate 94 through Albany. East of Albany the route is within one mile south of the Lake Wobegon Trail. On the east side of Avon the Lake Wobegon Trail is within the route at two locations for less than a mile. The trail is within the proposed ROW for approximately three miles as the route travels to St. Joseph. The route crosses a Stearns County Trail that connects St. Joseph to Cold Spring where the route begins to parallels Interstate 94 again.

Route D Undergrounding

Undergrounding at Freeport would not impact any trails whereas the above ground Route D ROW crosses the Lake Wobegon Trail. Therefore, the undergrounding alternative at Freeport would have less impact on this significant regional trail.

The undergrounding option at Albany parallels Interstate94 to the south where it would cross under a Stearns County trail that runs along CSAH 41 no disturbance would be anticipated as the transmission line would likely be directional-bored beneath the roadway.

The undergrounding option between Avon and St. Joseph would parallel portions of the Lake Wobegon Trail west of St. Joseph. Vegetation clearing of the proposed 60-foot ROW for the undergrounding option would change the visual character of the areas where the trail is surrounded by existing vegetation. While the underground option could change the visual landscape of the surface vegetation it would not introduce new elements, such as poles, in the landscape which would be required by the Route D above ground alternative in the same area.

Route E

Route E is similar to the Applicant Preferred Route from Sauk Centre to Freeport. Route E crosses multiple local snowmobile and multi-use non-motorized Stearns County trails. Route E crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County Trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. A Stearns County trail that travels between Albany and Sand Lake is inside the route for a short distance on Orchard Road. The route crosses a Stearns County trail that travels between St. Joseph and Cold Spring. A Stearns County trail is located in the proposed ROW where it parallels County Road 23 for approximately three miles into Cold Spring and the Sauk River. A Stearns County trail is located in the proposed ROW where it parallels County Road 23 for approximately three miles into Cold Spring and the Sauk River. A Stearns County trail is located in the proposed ROW where it parallels County Road 23 for approximately three miles into Cold Spring and the Sauk River.

Route F

Route F is similar to Route E from Sauk Centre to south of Albany where it takes a major diversion south to form an outer southern loop around the other proposed routes through Richmond, Cold Spring, and Rockville before looping into St. Cloud. Route F crosses several local snowmobile and multi-use non-motorized Stearns County Trails. Route F crosses a Stearns County Trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. A Stearns County trail that travels between Albany and Sand Lake is inside the route for a short distance on Orchard Road. North of St. Martin the route follows County Road 10 and crosses a Stearns County trail that connects New Munich and Richmond. Further, the route parallels a Stearns County trail along the east side of County Road 10 and travels to St. Martin; this trail lies within the proposed transmission line ROW.

West of Richmond, the Glacial Lakes State Trail is within the ROW for approximately one mile. Additionally, a Stearns County trail that follows County Road 23 is located in the route for less than a mile before it turns north on the west end of Richmond. Route F crosses this trail twice on both the west and east sides of Richmond. A Stearns County trail is located in the proposed ROW where it parallels County Road 23 for approximately three miles into Cold Spring and the Sauk River. As the route turns north and passes through Rockville it crosses another Stearns County trail.

Route G

Route G is similar to the Applicant Preferred Route between Sauk Centre and Freeport and like Route E turns south at Freeport. Route G crosses multiple local snowmobile and multi-use non-motorized Stearns County trails. Route G crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County trail on County Highway 12 to New Munich. West of Freeport the route is less than a mile south of the Lake Wobegon Trail. The route turns south at Freeport and traverses an area with many small lakes. The route continues south on County Road 11 which is paralleled by a Stearns County trail for approximately 1.5 miles in the proposed ROW. The route continues south on County Road 11 and crosses and east/west segment of a Stearns County Trail. North of St. Martin, Route G turns east to parallel the Sauk River. G also crosses a Stearns County trail that connects to St. Martin twice as it travels eastward and one that travels between St. Joseph and Cold Spring.

Route H

Route H is similar to the Applicant Preferred Route as it travels through Melrose. Route H crosses a Stearns County trail that travels south from Melrose on 335th Avenue. The route crosses a north/south oriented Stearns County trail on County Highway 12 to New Munich. Approximately two miles east of Melrose, County Road 237/12 intersects Interstate 94, at this location Route H turns south towards New Munich. A Stearns County trail is within the ROW for nearly one mile as the route travels south to New Munich. South of New Munich, the Route follows County Road 12 and parallels the Sauk River. The route crosses two additional segments of Stearns County trails south of Merlin Road and crosses another segment twice as it continues southward on County Road 12. North of St. Martin, Route G turns east to parallel the Sauk River. Route G also crosses a Stearns County trail that connects to St. Martin twice as it travels eastward. The route crosses a Stearns County trail that travels between St. Joseph and Cold Spring.

Table 7.3-3. Trail Impact Evaluation: Routes and Route Option Alternatives

Route/Option	Trail Crossings	
	Stearns County Trails	Lake Wobegon Trail
Route Alternatives		
Applicant Preferred Route	5	2
Route A	3	1
Route B	3	1
Route C	4	3
Route D	5	0
Route E	3	0
Route F	6	0
Route G	6	0
Route H	8	0
Option 8		
Applicant Preferred	0	0
Option 8	0	0
Option 9		
Applicant Preferred ROW Occupancy	1	0
Applicant Preferred No ROW Occupancy	1	0
Option 9	0	1
Option 10		
Route A	1	0
Option 10	1	0
Option 11		
Route E	0	0
Option 11	0	0
Option 12		
Route E	0	0
Route B Segments	0	0
Amended Scope Options		
Option AS-4	0	0
Option AS-5	0	0
Undergrounding Options		
Route D Undergrounding Freeport	0	0
Route D Undergrounding Albany	1	0
Route D Undergrounding Avon	0	2

Source: Billig, Jim. Central and Northwest Minnesota All-Outdoors Atlas. 2007.

Based on a review of all of the alternatives, some routes had much greater impacts on recreational resources, some were moderate, and some were minimal. With respect to recreational impacts it important to recognize that resource value can be subjective based on users. However, during scoping, the public input clearly advocated for the preservation of the

Lake Wobegon Trail and expressed concerns about impacts to the trail. Of the proposed routes, the Applicant Preferred Route, Routes A, B, and C all cross the Lake Wobegon Trail and Route D parallels the trail.

The proposed routes cross between three and eight local and county trails. County trail crossings of snowmobile and multi-use non-motorized trails were evaluated but most of these exist along existing roadway shoulders and are used as seasonal trails so they are not as significant impacts as impacts to state trails or river crossings.

Land use impacts to areas designated as recreation/park vary between routes. Routes A, B, E, G, and H have the least amount of land use as recreation/park within the proposed ROW. The Applicant Preferred Route and Routes C and D have five to seven acres of recreation land use within the ROW and Route F has the greatest amount with 11 acres of recreation land use within the ROW. The Route Options affect recreation/park land use similarly to the proposed routes.

Routes D and F have the greatest impacts on recreational resources. While the Lake Wobegon Trail is not crossed by Route D it is within the route's 150 foot ROW for approximately 8 miles and is less than one mile from the route at other locations. Impacts to the Lake Wobegon Trail would be minimized if the undergrounding option between Avon and St. Joseph is implemented. This would represent a major impact on the trail. Route D also includes two wayside areas, a golf course, and crosses the Sauk River twice. Route F impacts the greatest number of recreational resources. While it does not cross the Lake Wobegon Trail it is within one mile of a portion of the route and the proposed ROW does include another regional state trail; the Glacial Lakes State Trail alignment. Route D travels through Richmond where a chain of 14 lakes provides recreational opportunities for fishing and boating as well as vacation destinations at lakeside resorts.

The Applicant Preferred Route and Route C have the next greatest impacts on the Lake Wobegon Trail and recreation resources. The Applicant Preferred Route crosses the trail twice and is located within one mile from at its western end. Further, the Applicant Preferred Route crosses the Sauk River twice and is directly adjacent to two recreational lakes. Route C has the greatest number of Lake Wobegon Trail crossings at (three) and also travels through a game refuge.

Routes G and H have limited impacts on recreational resources and do not cross the Lake Wobegon Trail. However, a portion of Route G does come within one mile of the trail. Both routes are located within one mile of a county park but Route H has more impacts to the Sauk River than any other alternative because the river is located within portions of the route and is paralleled by the alignment for the greatest distance.

Routes A and B have the limited impacts on recreational resources. Both cross the Lake Wobegon Trail one time, and impact one wayside rest area, they only cross the Sauk River once.

Route E has the fewest overall impacts to recreational resources. While several lakes are adjacent to/within the proposed route, only two have boat launches. Route E crosses the Sauk River at two locations but does not impact the Lake Wobegon Trail.

Scenic Byways

No scenic byways are impacted between Sauk Centre to St. Cloud.

Visual Impacts and Aesthetics

The Project, from Fargo to St. Cloud, extends diagonally across the state. Similarly, Interstate 94 runs diagonally in a southeast to northwest between St. Cloud and the Fargo area. Throughout the route development process, Applicants have sought to identify areas to share rights-of-way with existing infrastructure, including roads, railroads, and existing transmission corridors. The proposed transmission line will likely affect visual resources within close proximity of the line. The proposed line will be constructed primarily on single-pole, double circuit capable, self-weathering or galvanized steel structures (se Diagram 7-3).

Diagram 7-3. Representative 345 kV Double Circuit Single Pole Structure (Self-Weathering)

All of the routes and the route options require corner structures needed for right-angle turns in line. Where angle structures are required at 90 degree turns in the line the linear nature of the facility will be broken and this interruption will make a greater visual impact than tangent structures.

In general, structures would have drilled pier concrete foundations (Diagram 5-57-4). Drilled pier foundations may vary from six to nine feet in diameter and 25 or more feet deep, depending on soil conditions.

Diagram 7-4. Pier Foundation

Visual resources would be impacted by the introduction of the proposed 345 kV transmission line into the regional landscape. The transmission line would introduce new vertical forms or lines in areas where it would not otherwise parallel an existing transmission line. Since the area is largely rural, the proposed 345 kV line may introduce color contrasts during some lighting conditions or seasons. In addition to the proposed single pole steel structures, establishment of the required right of-way may alter color and textural contrasts as a result of vegetation removal. Vegetative tree species and some shrub species will be permanently removed within the right-of-way. The vegetation clearing necessary for construction and operation may create a dramatic change in the ROW cover in some areas.

In flat or rolling terrain, common in the Project area traversed by the routes, structures can be visible at distances greater than a mile. In the context of agricultural lands the pole structures would be visible from distances of up to two miles. The average height of 130-175 feet makes the new facility visible in the local communities and generally in the landscape. Transmission lines are likely to be seen only at distances up to three quarters of a mile at the most. The greatest visual impact would be in the interstate viewshed and agricultural landscape.

Sensitive viewpoints include locations from which a significant number of people who have a concern for scenic resources would view a landscape or an area that may be affected by the Project, or would otherwise be visually exposed to the Project. Potential sensitive viewpoints along the routes may include existing transportation corridors, designated scenic byways, existing residences within immediate proximity of the proposed electrical transmission line having an unobstructed line of sight of the proposed line, and recreational use areas.

In this segment the proposed routes north and south of Interstate 94 impact aesthetics similarly. Sensitive viewpoints along each route would be similar. Route A, a large portion of the Applicant Preferred Route, Route B, the majority of Route C, and Routes E, F, and G parallel property lines and secondary roads, and in some locations would extend cross-country along no specific linear feature. On the contrary, Route D and portions of the Applicant Preferred Route, Route B, and Route C parallel a pre-disturbed major transportation. Although the proposed 345 kV transmission line will introduce a new vertical form, line, color, and contrast in some areas, the proposed routes attempt to maximize the use of existing, pre-disturbed rights-of-way and

minimize the proximity to existing residences to the greatest extent practicable. Placing transmission lines along existing infrastructure is intended to minimize the introduction of new elements into undisturbed landscapes or homogeneous landscapes. Sensitive viewpoints along the route options and the potential for impact to visual resources as it relates to these viewpoints would be similar to those described above for the Applicant Preferred Routes and Routes A-H. None of the proposed routes or options would impact any designated scenic byways.

Residences within 500 feet of the alignments and within the proposed 150-foot ROW are presented in Tables7.3-4 and 7.3-5.

Table 7.3-4. Aesthetic Impact Evaluation for Routes

Route/Option	Homes	
	Within 500' of Alignment	Within 150' of Alignment
Route Alternatives		
Applicant Preferred ROW Occupancy	83	0
Applicant Preferred No ROW Occupancy	82	0
Route A	116	0
Route B	191	0
Route C	77	1
Route D	179	9
Route E	76	0
Route F	206	1
Route G	88	0
Route H	96	0
Route Options		
Option 8		
Applicant Preferred Route	0	0
Option 8	0	0
Option 9		
Applicant Preferred ROW Occupancy	3	0
Applicant Preferred No ROW Occupancy	3	0
Option 9	7	0
Option 10		
Route A	1	0
Option 10	0	0
Option 11		
Route E	11	0
Option 11	4	0
Option 12		
Route E	0	0
Route B Segments	3	0
Amended Scope Options		
Option AS-4*	NA*	NA*
Option AS-5	4	0

**Option AS-4 is a wide area without a centerline or alignment, however five residences are located in this expanded area that would not be impacted by Route E.*

Table 7.3-5. Aesthetic Impact Evaluation for Underground Options

Route	Homes		
	Within 500' of Alignment	Within 60' of Alignment	Within 150' of Alignment
Underground Options			
Route D Undergrounding Freeport	21	0	NA
Route D Above ground Freeport	21	NA	1
Route D Undergrounding Albany	3	0	NA
Route D Above ground Albany	3	NA	1
Route D Undergrounding Avon	76	1	NA
Route D Above ground Avon	76	NA	5

There are fewer homes within 500 feet of the Applicant Preferred Route alignment than all of the other proposed routes except Route E, which suggests that fewer households would directly view the line. There are 83 homes within 500 feet of the Applicant Preferred ROW Occupancy alignment, 82 homes within 500 feet of the Applicant Preferred Route No ROW Occupancy alignment and 76 homes within 500 feet of Route E. Routes G and H impact 88 and 96 homes, respectively, within 500, and Route A impacts the next highest number of homes with 116 within 500 feet of the alignment. The greatest number of homes within 500 feet of the alignment is 191 for Route B and 206 for Route F. Only one home is located within a proposed ROW and that occurs in Route F which represents the greatest overall impacts to residences. The undergrounding options for Route D would reduce the number of homes impacted because the option would not introduce new elements, such as poles, into the landscape that would be required for the Route D above ground option in the communities of Freeport, Albany, and Avon. However, while the undergrounding option near Avon only includes one home within the ROW, there is a potential to impact access to other homes in the area that rely on the frontage road for access.

Route options do not include any homes within their proposed ROWs. Option 9 would impact four more homes than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments. Option 10 would impact one less house than Route A and Option 11 would impact seven fewer homes than Route E. Option 12 would include three additional homes within 500 feet of Route E. Option AS-4 is not a traditional alignment but rather a wider area that would include five additional homes. Finally, Option AS-5 would impact one additional home that would not be impacted by the alternate Route B segments.

7.3.3 Mitigation

No impacts on recreational uses that would alter or limit the use of these areas are anticipated, therefore, no mitigative measures are proposed.

Based on a viewer's response and sensitivity, the presence of transmission lines can detract from the visual attractions of an area. Landowners could be consulted to identify concerns. Wherever possible, the proposed transmission lines could be routed alongside existing power lines and section lines, as well as within road, rail, and utility ROWs, to minimize any adverse impacts.

The transmission line would contrast with surrounding land uses, landowners could be consulted to identify any concerns related to the Project and visual aesthetics.

Generally, mitigation includes enhancing positive effects as well as minimizing or eliminating negative effects. Mitigation measures would not vary between alternative routes. Potential mitigation measures could include:

- The placement of structures to allow the maximum feasible distance between residences within the limits of the structure design.
- Final structure locations, ROW, and any disturbed areas could be determined by considering input from landowners or land management agencies to minimize visual impacts.
- Consideration could be made to preserve the natural landscape; construction and operation would be conducted to prevent unnecessary destruction, scarring, or defacing of the adjacent natural setting in the vicinity of the Project.
- If undergrounding is implemented in some locations, transition structures could be sited to minimize visual impacts on surrounding land uses such as residences through fencing or vegetative screening/buffering around the facility.
- To the extent possible, transmission lines could parallel existing transmission lines and existing ROWs without violating sound engineering principles or system reliability criteria.
- Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design.
- Along existing roadways, transmission line alignments could be placed at locations with the fewest impacts to existing ROW.

Visual screening with vegetation could be considered in the foreground where the route parallels scenic byways but due to the height of the structures the transmission lines may still be visible in the background.

7.4 TRANSPORTATION

This section discusses potential impacts and mitigation on local roadways, highways, and airports in the area of the project. Paralleling roadways reduces the need for additional transmission line right of way. Under the routes evaluated for this project, transmission lines would parallel and cross roads including township roads, county roads, county highways, state highways, and one interstate highway. Impacts can be anticipated when the transmission line crosses over or under a roadway or when local or state government expands existing roadways and utility poles require relocation.

7.4.1 Affected Environment

Each of the route alternatives pass through a roadway network consisting of various interstate, state, county, city, and other local roadways (Appendix H). Many of the roadways in the area are

low volume roadways that primarily serve farm to market functions. Stearns County has responsibility for the operation and maintenance of county roadways which include county state-aid highways and county roads. Mn/DOT also has responsibility for planning and funding roadway improvements, including interstate highways, U.S. highways, and state trunk highways.

Roadways

Most of the routes and options include segments that run adjacent and parallel to existing roadways. The tables below list the roads that the route alternatives run parallel to, starting at the Quarry Substation and continuing west.

Table 5.4-1 lists the main roads that the Applicant Preferred Route would follow and traffic data, if available, for those roads.

Table 7.4-1. Average Annual Daily Traffic for Selected Roads Parallel to the Applicant Preferred Route

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
304th Street	NA	0.2
CSAH 133	6,200	3.4
338th Street	NA	1.1
County Road 52	630	1.5
County Road 155	415	0.5
363rd Street	NA	0.5
CSAH 9	2,750	0.3
360th Street	NA	3.5
County Road 154	870	0.5
205th Avenue	NA	0.5
St. Anna Drive	NA	1.0
CSAH 10	1,300	1.0
380th Street	NA	1.3
MN 238	1,200	1.0
CSAH 39	440	3.6
County Road 167	1,650	0.6
Interstate 94	24,400 to 27,000	6.9
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2006-2009.

NA: Traffic data is not available for this roadway segment.

Table 5.4-2 lists the main roads that Route A would follow and traffic data, if available, for those roads.

Table 7.4-2. Average Annual Daily Traffic for Selected Roads Parallel to Route A

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
304th Street	NA	0.2
County Road 133	6,200	3.4
338th Street	NA	1.1
County Road 151	300	4.5
190th Avenue	NA	1.0
CSAH 17	1,700	9.4
280th Avenue	NA	0.5
CSAH 17	2,850	7.3
355th Avenue	180	2.4

Source: Minnesota Department of Transportation, 2009.
NA: Traffic data is not available for this roadway segment.

Route A follows the Applicant Preferred Route from the Quarry Substation, until the route travels to a point near the intersection of CSAH 3 and CSAH 5, where it deviates to the north along parcel lines, then travels west along parcel lines and roadways for approximately 36.3 miles, before heading south along parcel lines and 355th Avenue for 4 miles, where the segment ends near Interstate94.

Table 7.4-3 lists the main roads that Route B would follow and traffic data, if available, for those roads.

Table 7.4-3. Average Annual Daily Traffic for Selected Roads Parallel to Route B

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
Interstate 94	24,800	4.1
CSAH 2	NA	0.5
CSAH 3	1,600	11.5
County Road 151	300	4.5
190th Avenue	NA	1.0
CSAH 17	1,700	9.4
280th Avenue	NA	0.5
CSAH 17	2,850	7.3
355th Avenue	180	2.4

NA: Traffic data is not available for this roadway segment.

Route B follows MN 23 Southwest out of the Quarry Substation, then follows Interstate 94 northwest for 4.1 miles, then follows CSAH 2 east for 0.5 miles, then parcel lines and CSAH 3

north and west for 11.5 miles. From this point the route follows Route A to the end of the segment near Melrose.

Table 7.4-4 lists the main roads that Route C would follow and traffic data, if available, for those roads.

Table 7.4-4. Average Annual Daily Traffic for Selected Roads Parallel to Route C

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
Interstate 94	22,600 to 43,000	9.1
Queens Road	NA	4.5
CSAH 9	1,600	0.3
360th Street	NA	3.5
County Road 154	870	0.5
205th Avenue	NA	0.5
St. Anna Drive	NA	1.0
CSAH 10	1,300	1.0
380th Street	NA	1.3
MN 238	1,200	1.0
CSAH 39	440	3.6
County Road 167	1,650	0.6
Interstate 94	24,400 to 27,000	6.9
370th Street	NA	1.8

Source: Minnesota Department of Transportation,2006-2009.
NA: Traffic data is not available for this roadway segment.

Route C follows MN 23 southwest out of the Quarry Substation, then follows Interstate 94 to northwest for 9.1 miles, then follows parcel lines, an existing 69 kV transmission line, and Queens Road north and west for 4.5 miles, then CSAH 9 north for 0.3 miles. From this point the route follows the Applicant Preferred Route to the end of the segment near Melrose.

Table 7.4-5 lists the main roads that Route D would follow and traffic data, if available, for those roads.

Table 7.4-5. Average Annual Daily Traffic for Selected Roads Parallel to Route D

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
Interstate 94	25,500 to 32,500	4.1
CSAH 2	NA	0.5
CSAH 3	1,600	1.1
Norway Rd	2,500	2.0
County Road 159	900	1.0
I-94	24,400 to 27,000	22.2
County Road 157	1,100	1.5
Interstate 94	24,400 to 25,500	5.0
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2009.

NA: Traffic data is not available for this roadway segment.

Route D follows the same path as Route B from the Quarry substation (MN 23, Interstate 94, CSAH 2, CSAH 3) to CSAH 3 and the BNSF Railroad. From there, it deviates from Route B by following the BNSF Railroad northwest until it intersects with Norway Road, then follows Norway Road west to Interstate94. The Route then follows Interstate-94 for 15.3 miles, to Interstate94 and Rimcrest Road, then follows the Applicant Preferred Route to the end of the segment near Melrose.

There are two full-service rest areas along Interstate94 in the Sauk Centre to St. Cloud section that may be affected by Route D. The Big Spunk Lake rest area (for eastbound traffic) is located 1.5 miles west of the Avon interchange (CSAH 9) in Stearns County. The Middle Spunk Lake rest area (for westbound traffic) is located 1 mile west of the Avon Interchange (CSAH 9) in Stearns County (Mn/DOT, 2009b).

If portions of transmission lines along Route D are installed underground, all of the roadways listed above could be impacted. In addition, impacts could occur for every roadway under which the transmission would cross. These roadways are shown in Table 7.4-6.

Table 7.4-6. Average Annual Daily Traffic for Selected Roads Intersecting Route D (Underground Option)

Road	Existing Average Annual Daily Traffic
CSAH 75	12,100
Interstate 94	32,500
CSAH 50	3,050
CSAH 9	900
Upper Spunk Lake Rd	210
MN 238	6,000
CSAH 10	1,900
7th St SE	NA
CSAH 11	810

Source: Minnesota Department of Transportation, 2009.
NA: Traffic data is not available for this roadway segment.

Table 7.4-7 lists the main roads that Route E would follow and traffic data, if available, for those roads.

Table 7.4-7. Average Annual Daily Traffic for Selected Roads Parallel to Route E

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
County Road 160	590	1.4
Island Lake Road	NA	1.3
260th Street	NA	3.9
CSAH 9	860	3.0
290th Street	NA	1.0
Clear Lake Road	NA	0.5
Mapleview Road	NA	2.1
Sand Lake Road	NA	2.1
340th Street	NA	1.0
Orchard Road	NA	1.3
CSAH 10	1,400	0.2
County Road 174	220	2.5
CSAH 30	330	2.7
Rimcrest Road	NA	2.4
Interstate94	24,400 to 27,000	6.9
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2009.
NA: Traffic data is not available for this roadway segment.

Route E follows a route that runs parallel to the BNSF tracks from the Quarry substation and travels to the southwest to County Road 160, where it runs to the west for 1.4 miles. The route then follows Island Lake Rd to the south for 1.3 miles, then 260th Street to the west for 3.9 miles. The route then runs north along CSAH 9 for 3 miles, west along 290th street for 1 mile, then north along several local roadways for 4.7 miles. The route then runs west along 340th Street, Orchard Rd, CSAH 10, County Rd 174, and CSAH 30 for 7.7 miles. The route then runs to the north along Rimcrest Rd for 2.4 miles, then follows the Applicant Preferred Route to the end of the segment near Melrose.

Table 7.4-8 lists the main roads that Route F would follow and traffic data, if available, for those roads.

Table 7.4-8. Average Annual Daily Traffic for Selected Roads Parallel to Route F

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	8,700 to 15,800	14.5
County Rd 111	720	1.0
CSAH 12	1,100	4.6
CSAH 10	1,400	9.1
County Rd 174	220	2.5
CSAH 30	330	2.7
Rimcrest Rd	NA	2.4
Interstate94	27,000 to 32,500	22.2
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2009.

Route F follows a route that runs parallel to the BNSF tracks from the Quarry substation and travels to the southwest to MN 23, where it runs to the west for 14.5 miles. The route then follows County Road 111 to the northwest for 1 mile, then CSAH 12 to the northwest for 4.6 miles. The route then travels north and northeast on CSAH 10 for 9.1 miles, then follows Route E to the west and north, then follows the Applicant Preferred Route to the end of the segment near Melrose.

Table 7.4-9 lists the main roads that Route G would follow and traffic data, if available, for those roads.

Table 7.4-9. Average Annual Daily Traffic for Selected Roads Parallel to Route G

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
County Road 160	590	1.4
Island Lake Rd	NA	1.3
260th Street	NA	3.9
CSAH 9	860	1.0
CSAH 42	370	3.5
CSAH 23	265	1.0
County Road 177	190	2.6
CSAH 12	750	0.7
CSAH 11	350	7.0
CSAH 30	330	0.8
Rimcrest Rd	NA	2.4
Interstate 94	24,400 to 27,000	6.9
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2009.

Route G deviates from Route E at CSAH 9 and CSAH 42. Route G follows CSAH 42 to the west for 3.5 miles, then CSAH 23 to the northwest for 1 mile. Route G then follows County Road 177 to the west for 2.6 miles, then CSAH 12 for 0.7 miles. Route G turns to the north and runs along CSAH 11 for 7 miles, until it intersects Route E at CSAH 30. Route G then follows Route E to the west and north for 3.2 miles, then follows the Applicant Preferred Route to the end of the segment near Melrose.

Table 7.4-10 lists the main roads that Route H would follow and traffic data, if available, for those roads.

Table 7.4-10. Average Annual Daily Traffic for Selected Roads Parallel to Route H

Road	Existing Average Annual Daily Traffic	Parallel Length (miles)
MN 23	15,800	0.2
County Road 160	590	1.4
Island Lake Rd	NA	1.3
260th Street	NA	3.9
CSAH 9	860	1.0
CSAH 42	370	3.5
CSAH 23	265	1.0
County Road 177	190	2.6
CSAH 12	750 to 1,450	10.1
MN 273	1,700	2.5
Interstate 94	24,400 to 27,000	4.7
370th Street	NA	1.8

Source: Minnesota Department of Transportation, 2009.

Route H follows Route E from the Quarry Substation, then follows Route G west for several miles until the intersection of County Road 177 and CSAH 12, where it follows CSAH 12 west and north for 10.1 miles. Route H then bypasses New Munich through private land to the east and north, then follows MN 273 north for 2.5 miles. Route H then follows the Applicant Preferred Route to the end of the segment near Melrose.

Table 7.4-11 lists the main roads that the route options would follow, and the traffic data, if available, for those roads.

Table 7.4-11. Average Annual Daily Traffic for Selected Roads Parallel to Route Options

Route	Route Description	Existing Average Annual Daily Traffic	Parallel Length (miles)
Option 8			
Applicant Preferred Route	370th Street	NA	0.5
Option 8	Parcel Lines	NA*	0.6
Option 9			
Applicant Preferred Route	Interstate 94	24,400 to 25,500	4.5
Option 9	S 12th Ave E	NA	0.5
Option 9	Trails, Parcel lines	NA*	4.5
Option 10 *			
Route A	CSAH 17	1,650	0.5
Option 10	Trails, Parcel lines	NA*	1.1
Option 11			
Route E	County Road 160	590	1.4
Route E	Island Lake Rd	NA	1.3
Option 10	Parcel Lines	NA*	2.0
Option 10	CSAH 2	3,400	1.5
Option 12B			
Route B	MN 23	15,800	0.2
Route B	Interstate 94	24,800	0.6
Option 12B	MN 23	15,800	0.2
Option 12B	Interstate94	24,800	0.6
Option 12E			
Route E	BNSF Railroad ROW	NA*	1.0
Option 12E	BNSF Railroad ROW	NA*	1.0
Option AS-4			
Route E	340th Street	NA	1.0
Route E	Orchard Rd	NA	1.3
Route E	CSAH 10	1,400	0.2
Option AS-4	Parcel Lines/Fields	NA*	2.6
Option AS-5			
Option 12E	BNSF Railroad ROW	NA*	1.0
Option AS-5	CSAH 138	3,050	1.0

Source: Minnesota Department of Transportation, 2006-2009.

NA: Traffic data is not available for this roadway segment.

**Length of Route along parcel lines, field lines, or trail/railway ROW.*

Option 8 is approximately 0.6 miles in length and deviates from the Applicant Preferred Route just southwest of Melrose. Option 8 deviates from 370th Street 0.25 miles sooner and heads

northwest until it rejoins the Applicant Preferred Route to avoid land where an owner may expand a feed lot. Option 9 deviates from the Applicant Preferred Route along Interstate 94 at 12th Ave E in Melrose, where it travels north along 12th Ave E for 0.5 miles, then travels east along the Lake Wobegon Trail for 4.5 miles, before rejoining the Applicant Preferred Route near County Road 167. Option 10 deviates from the Applicant Preferred Route at CSAH 17 and 425th St just north of St. Rosa, where it travels east along parcel lines/field lines for 1.1 miles, then rejoins the Applicant Preferred route at 280th Street. Option 11 deviates from Route E near the intersection of 260th Street and Island Lake Rd, where it travels east along parcel lines for 2 miles, then north along CSAH 2 for 1.5 miles until rejoining Route E. Option 12B is a connection option between Route B and the Quarry substation that travels southeast along I-94 for 0.6 miles, then northeast along MN 23 for 0.2 miles. Option 12E is a connection option between Route E and the Quarry substation that travels along the BNSF Railroad ROW for 1.0 miles.

Amended Scope (AS) Option 4 is approximately 2.6 miles in length and runs 0.5 miles south of and parallel to Route E between CSAH 10 and CSAH 41. AS Option 4 travels through fields and does not have the potential to affect any additional roadways. AS Option 5 is an alternative connection between Routes B, C, and D and the Quarry Substation. This Route travels along a field and CSAH 138 for 1.0 miles between Interstate94 and the Quarry Substation.

Airports

HVTLs can present an important safety concern to airports and aircraft. An airport, whether public or private, is defined by the state and the Federal Aviation Administration (FAA) as an area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any. (14 C.F.R. Part 1, §1.1 and Minn. R. 8800.0100, Subp. 3). The placement of transmission line structures or the stringing of conductors between structures could impact the safe operation of an airport or hinder the maneuverability of aircraft. If close enough, the presence of a steel transmission line structure or wiring could interfere with the operation of air navigation or weather systems.

The physical dimensions of airport runways determine the class size of aircraft capable of landing at an airport. Furthermore, the aircraft design and propulsion system are determinants in an aircraft's ability to land at a given facility. For example, jet aircraft are heavier, typically require a greater runway length for take-off and landing, and require more glide slope clearance distance compared to propeller-driven aircraft. Both of these factors are important in relation to structures such as transmission lines because they determine the take-off and landing glide slopes necessary for safe flight operation, which in turn determine the setback distance of structures such as transmission lines.

The FAA and Mn/DOT have established development guidelines on the proximity of structures, including HVTLs, to public use airports and heliports. Federal Aviation Regulation (FAR) Part 77 establishes standards and notice requirements for reporting airspace obstructions for objects currently impacting or that could impact navigable airspace around aviation facilities. FAR Part 77 defines a series of imaginary surface zones surrounding airports that specify height restrictions for structures based on slope ratios. These imaginary surfaces include the primary

surface, horizontal surface, conical surface, approach surface, precision instrument approach surface, and the transitional surface. According to FAR Part 77, "an object will be considered an obstruction to a public airport (excluding seaplane bases and heliports) if it is of greater height" than any of the aforementioned imaginary surfaces. Each of these imaginary surfaces have corresponding slopes, based in part on the airports' use designation, flight volumes, and plane size capabilities. All surfaces are measured at the mean sea-level elevation of the airport. If necessary or appropriate, Applicants would file the required notice with FAA pursuant to the requirements set forth by FAR Part 77, Subsection 13.

In addition to FAA regulations, the state of Minnesota establishes air navigation obstruction criteria under Minn. R. Ch. 8800. These regulations are intended to control the type of development around airports to prevent incompatible land uses. The state regulations are similar to the FAA regulations as published in FAR Part 77. State runway Safety Zones A through C, which follow the runway approach zones and restrict specific types of development, are included as this part of these regulations. Safety Zones A and B are the most restrictive. Safety Zone A does not allow any buildings or temporary structures, places of public assembly or transmission lines; Safety Zone B does not allow places of public or semipublic assembly (i.e., churches, hospitals, or schools).

Permitted land uses in both zones include agricultural uses, cemeteries, and parking lots. A complete description and copy of the Minn. R. Ch. 8800 Department of Transportation Aeronautics Section 2400 Airport Zoning Standards can be found at http://www.dot.state.mn.us/aero/avoffice/planning/zoning.html.

Furthermore, certain objects such as steel pole transmission line structures have the potential to conflict with the operation of airport navigational aids and weather observation station facilities. Specifically, these facilities include Very High Frequency Omnidirectional Radio Range (VOR) air navigation systems and Automated Weather Observation Stations (AWOS). FAA Order 6820.10 "VOR, VOR/DME, and VORTAC Siting Criteria," specifies the distance setback requirements for trees, buildings, and metallic structures. Within this order, obstruction criteria for a VOR facility are identified, in addition to setback distances for transmission line structures. These regulations specify that overhead transmission line structures with conductors should be located beyond 1,200 feet of the VOR antenna to avoid communication interference. Additionally, the top of metallic structures are required to be at vertical angle of 1.2 degrees or less, measured from the ground elevation of the VOR facility. As applied here, structures of 130 feet in height must be 6,206 feet away from a VOR air navigational station to avoid interference with the operation of the facility. Transmission structures of 140 feet in height must be 6,683 feet away and transmission structures of 175 feet in height must be 8,354 feet away from a VOR.

7.4.2 Potential Impacts

The primary impacts related to roadways involve compatibility with roadway expansion plans, safety requirements, and temporary construction impacts.

Roadway ROW and Expansion Plans

The applicants have indicated that a 150-foot wide ROW (easement) would be required for the proposed transmission line. Specialty structures may be required for long spans or in environmentally sensitive areas. In these cases, a ROW of up to 180 feet may be required. When a transmission line is placed entirely across private land, an easement for the entire 150-foot to 180-foot-wide ROW would need to be acquired from the landowner(s). The applicants have indicated they would locate the poles as close to property division lines as reasonably feasible to reduce the amount of ROW impact on a particular property.

When paralleling roadways, the applicants plan to install poles just outside the public roadway ROW. Placement of poles would typically range from 25 feet to 75 feet into fields or other private property when possible. Thus, although the pole is still located on private property, the transmission line can occupy some of the public ROW, thereby reducing the size of the easement required from the private landowner. For example, if the required ROW is 150 feet, and the pole is placed twenty-five feet off of an existing road ROW, then a 100-foot easement would be required from the landowner. The transmission line ROW would occupy a 50-foot-wide section of roadway ROW. By keeping the poles at least 25 feet from the roadway ROW, the potential for having to relocate utility poles due to future roadway expansions is reduced.

If portions of the transmission line are installed underground, the required ROW width would be 60 feet.

In order to occupy roadway ROW, the applicants would need to acquire necessary approvals from the owner or the agency (e.g., Mn/DOT). Mn/DOT's Utility Accommodation Policy outlines the policies and procedures governing use and collocation of state trunk highway ROWs by utilities. The policy was developed in accordance with the requirements of state and federal law (Code of Federal Regulations, Title 23, Part 645, Subpart B). It is designed to ensure that the placement of utilities does not interfere with the flow of traffic and the safe operation of vehicles.

Mn/DOT has a responsibility to preserve the public investment in the transportation system and to ensure that non-highway uses of the ROW do not interfere with the ability of the state to make long-term highway improvements, such as adding lanes, interchanges, or bridges, or to safely maintain the existing system. In addition, state law requires Mn/DOT to reimburse the utility if a utility must be relocated from an ROW along an interstate highway as a result of future expansion or new interchanges.

Requirements vary based on whether the utility is crossing the highway or being installed parallel to it, and on the type of highway. For controlled access highways or freeways, Mn/DOTs Utility Accommodation Policy states: "The installation of new utility facilities shall not be allowed longitudinally within the right-of-way of any freeway, except in special cases under strictly controlled conditions." This means that the transmission structure–the poles and davit arms–must be completely outside of the ROW. For this Project, this would mean placing a pole approximately 20 to 25 feet outside the right-of-way.

The Utility Accommodation Policy does provide for exceptions where special circumstances exist. If the highway is part of the National Highway System, the exception must be approved by the Federal Highway Administration and would be considered a federal action, meaning that the requirements of the National Environmental Policy Act must be met.

Future Roadway Improvement Projects

The Mn/DOT State Transportation Improvement Program contains a list of programmed projects that have received funding for fiscal years 2010-2013 in the study area. The Mn/DOT Statewide 20-Year Highway Investment Plans: 2009-2028 contains descriptions of planned projects that may be implemented at a future date. These documents were reviewed to determine which programmed (funded) and planned projects may be impacted by the Project alternatives. A summary of these projects in presented in Table 7.4-12.

Table 7.4-12. Programmed and Planned Projects Within Study Area.

Route	Project Area	Length (miles)	Description	Route								
				Applicant Preferred Route	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Interstate 94	Sauk Centre to Albany	17.3	Install Median Cable Barrier	X	X	X	X	X	X	X	X	X
Interstate 94	Interstate 94/ CSAH 2 Interchange	1	Install Interchange Lighting			X	X	X				

It is important to note that the presence of underground transmission lines, as proposed for portions of Route D, would prevent new roadways from being built on top of the 60 foot wide ROW. In addition, the installation of the line may require a permanent closure or rerouting of a portion of Upper Spunk Lake Road, approximately 0.5 miles east of the Upper Spunk Lake Rest Area.

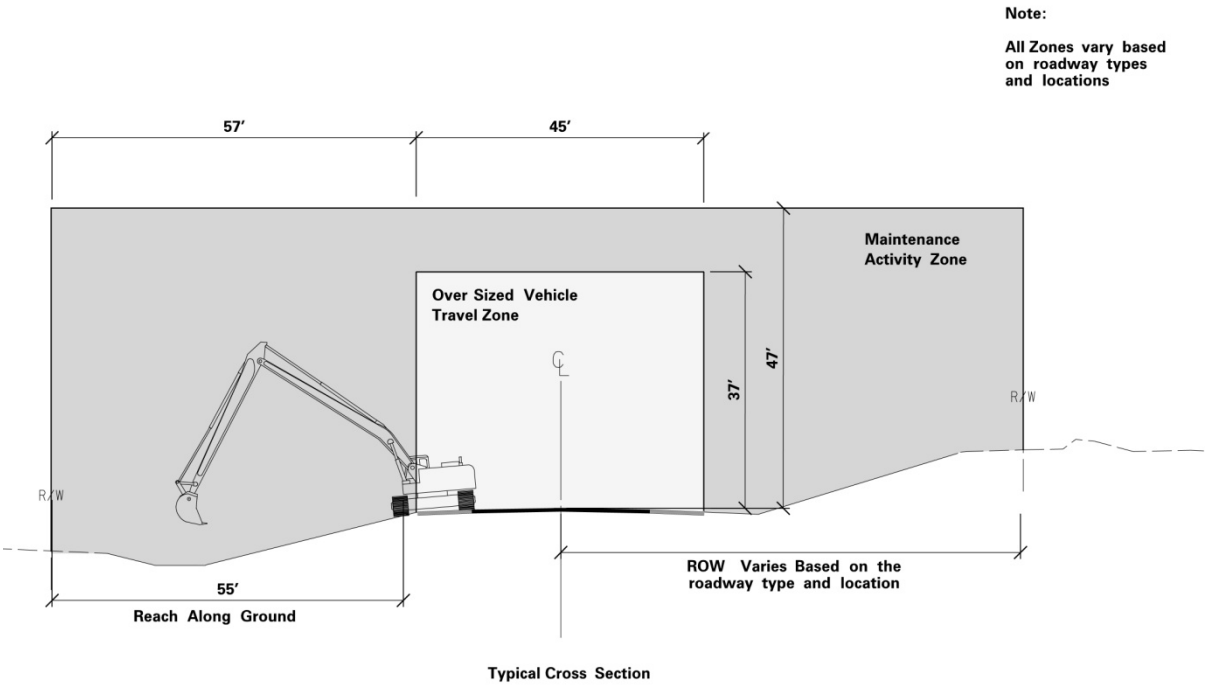
Roadway ROW and Safety Requirements

The poles must also be located a sufficient distance from the edge of the traveled roadways so as not to present a safety hazard. Most roadways have clear zones to provide a safety buffer between the roadway and adjacent land uses for errant vehicles. These areas may consist of a shoulder, a recoverable slope, a non-recoverable slope, or a clear run-out area. Requirements for clear zones and roadside obstruction vary based on traffic volume, design speed, roadside geometry, radius of horizontal curve, presence of a curb, and presence of urban or rural roads, collectors, arterials, or freeways. A brief review of clear zone requirements from state and federal manuals provides some guidance.

For very low-volume local roads, such as township roads, the American Association of State Highway and Transportation Officials state that, "at a location where a clear recovery area (an area free of hazards along the edge of a road) of two meters (six feet) or more in width which can be provided at low cost and with minimum social/environmental impacts, provision of such a clear recovery area should be considered." (AASHTO Green Book, 2001). However, they also state that where constraints make these impractical, clear recovery areas of less than two meters may be used. They also suggest consideration of other factors including the presence of vehicles wider than 2.6 m (8.5 ft) such as farm equipment.

The Mn/DOT Road Design Manual Part I and Part II, Chapter 4 (4-6(6)-4-6(20)) provides charts to determine clear zone widths based on speeds and side slope type. There are 11 different tables in this manual for determining clear zone widths based on daily traffic, cut or fill slopes, and design speed. In addition, the State of Minnesota also provides a formula for adjusting the clear zone on the outside of horizontal curves and a table for increasing clear zone widths when there are curbs greater than four inches. Given the complexity of roadway design, it is not appropriate to generalize about what is considered "safe" in regard to placing transmission line poles adjacent to roadways. The safe zone would have to be determined case by case. To obtain a general sense of this issue, Diagram 7-5 depicts a "zone of activity" as defined by Mn/DOT. In general, impacts to this zone should be avoided to minimize safety related issues associated with normal traffic operations.

Diagram 7-5. Mn/DOT Zone of Activity



The alternatives could have potential safety implications for roadway maintenance. Typical roadway and right-of-way maintenance activities, such as mowing, refuse and debris removal, and sign replacement and inspections may occur in close proximity to the transmission lines.

The presence of maintenance equipment and personnel near transmission lines may increase the risk of coming into contact with the transmission lines or arc flashes, especially from high temperatures, wind, and precipitation that cause sagging or blowouts.

Under certain wind conditions, the conductors could sway or "blow out" over the right-of-way. This type of blowout potential occurs when the wind essentially pushes the conductors sideways and up into the airspace above the right-of-way. Moisture and ice can also cause the transmission lines to sag to lower than normal heights.

Underground transmission lines could have potential safety implications for roadway maintenance. The presence of the line underneath the roadway may limit digging activities. In addition, the heat produced by the operation of an underground line typically raises the temperature a few degrees at the surface of the earth above the line. This could cause more frequent freezing and thawing cycles, and could lead to increased pavement deformation and poorer performance.

The type of ROW occupancy option selected may have different impacts on these activities. The greater the amount of ROW occupancy, the greater the potential there is for safety impacts to maintenance activities and personnel. A greater ROW occupancy (e.g. 75 feet versus 5 feet) may potentially place limits on how roadway and ROW maintenance activities are carried out.

The safe movement of oversized goods could potentially be impacted by the alternatives. Interstate94 from St. Cloud to Moorhead is designated as a Super haul corridor. Super haul corridors are characterized as routes that can handle a 16-foot height limit, a 16-foot width limit with and 8-foot wide axle, a 130-foot length limit, and a 235,000 lbs weight limit. Mn/DOT is responsible for preserving the ability to accommodate these characteristics and improve upon them if feasible.

Temporary Construction Impacts

Most of the transportation related impacts due to the Project would be from construction activities and would also be temporary in nature. Temporary access for the construction of the new transmission lines would require a 20-foot-wide access trail constructed within the transmission line ROW or by short spur trails from the existing road network to the ROW. In some situations, private field roads or trails would be used. Permission form the property owner would be obtained prior to accessing the transmission line route. New access roads may also be constructed when no current access is available or if the existing access is inadequate.

Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

If portions of the line are installed underground, trenching and boring would be required. In most cases where the line would cross an existing roadway, boring holes would be drilled under the roadway. In some cases, trenching across all or a portion of a roadway may be required. This could lead to partial or full road closures between a few days to several weeks.

Temporary traffic impacts associated with construction equipment include material delivery and worker transportation. Typical construction equipment used on similar transmission line projects

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

It is estimated that construction of the transmission line and substation modifications would require 40 full-time employees with 25 devoted to transmission line construction and 15 to substation modifications. Part-time personnel may also be needed. Construction of the concrete foundations for the pole is estimated to require 5-6 concrete trucks. Given the small number of workers and construction vehicles, traffic disruptions would be minimal and localized.

Staging areas are usually established for the Project, as well as temporary lay-down areas. Materials are delivered to staging areas and stored until they are needed. Any staging or temporary lay-down areas outside of the transmission ROW would require permission from the landowners through rental agreements.

Construction activities along each of the routes have the potential to impact future roadway projects. Programmed projects include the installation of median cable guard rail along Interstate94 from Sauk Centre to Albany (17.3 miles), and the installation of new lighting at the Interstate94/CSAH 2 interchange. The Applicant Preferred Route and Routes A through A all have the potential to impact the median cable guard rail project. Routes B, C and D have the potential to impact the lighting installation at the Interstate94/CSAH 2 interchange. None of the route options (Options 8 through 12) or Amended Scope Options (AS 4 and AS 5) would impact any programmed or planned roadway projects (see Table 7.4-12).

Impacts to roadway traffic flow during construction are expected to be minimal. Temporary guard structures would be used to string conductor over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic. Transportation related impacts associated with Route A are similar to those described above for the Preferred Route. Most of the impacts are primarily from construction activities and would be temporary in nature. New access roads may also be constructed when no current access is available or if the existing access is inadequate.

Airports

There are no public-use airports within 5 miles of any route in the Sauk Centre-St Cloud section. The Sauk Centre Municipal Airport is located within 5 miles of these routes, but this airport is discussed in Chapter 6. There are two private airports within 5 miles of certain routes. While not subject to FAA regulations, the usage of these airports could be affected by the placement of transmission poles or conductors.

7.4.3 Mitigation

Roadways

Before construction begins, some potential impacts could be mitigated via coordination with the appropriate agencies and organizations regarding the placement of structures and construction

methods. Final structure locations, ROW, and any disturbed areas could be determined by considering input from responsible transportation agencies (e.g. Mn/DOT, counties, townships) to minimize visual or construction impacts. Structures could be located at the maximum feasible distance from highway and trail crossings within the limits of the structure design. The construction contractor could coordinate construction activities with the appropriate road agencies to avoid interference with their roadway construction and maintenance activities. The construction contractor could also work with the appropriate agencies to minimize impacts on roadway clear zones and rest areas.

Consideration of planned future transportation improvements could be made to select specific alignments that may be less likely to require future relocation. Where practical, crossings of roadway rights of way may be perpendicular to minimize the occupancy of roadway right of way airspace.

Construction of the project may require the use of private field roads or trails. The use of these access paths, plus the construction or use of any temporary access roads, staging or lay-down areas outside of the transmission ROW could require permission from the landowners through rental agreements. These areas should be restored to their preconstruction condition as much is feasibly possible, and may include regrading areas and restoring vegetation.

During construction, temporary guard structures may be used to string conductors over existing roads and railroads. The structures typically consist of directly imbedded poles with a horizontal cross piece to support the conductor at sufficient height above traffic.

Additional shielding of the transmission lines and equipment may be required in areas where roadway and ROW maintenance activities are expected to occur in close proximity with the transmission lines on a regular basis.

The additional construction and maintenance traffic on the surrounding roadway system is not expected to have a significant impact on traffic operations, and therefore, no mitigation is required.

Airports

With the proper safeguards and protective measures described above, impacts related to public health and safety are not anticipated. In addition, the proposed structures will comply with all FAA airport and VOR height restrictions. Therefore, no additional mitigative measures are proposed.

7.5 WIRELESS TECHNOLOGIES

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted (corona consists of the breakdown or ionization of air within a few centimeters of conductors and hardware). This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

7.5.1 Affected Environment

If radio interference from transmission line corona does occur, Moreover, AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the ROW to either side.

FM radio receivers usually do not pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88-108 Megahertz), and
- The excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

A two-way mobile radio located immediately adjacent to and 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.

Digital reception is in most cases more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they would impact digital television reception.

7.5.2 Potential Impacts

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose or damaged hardware may also cause television interference. The transmission line hardware would be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If interference occurs, Applicants could work with the microwave tower owner to mitigate the impacts.

If interference from transmission line corona does occur for an AM radio station that is within the station's primary coverage area and that had good reception before the Project was built, satisfactory reception can be obtained by appropriate modification of the receiving antenna system. No widespread interference to television or radio reception is anticipated as a result of the project.

There are three communication towers within the Applicant Preferred Route, two where route C and the Applicant Preferred route intersect and one where route A and Applicant Preferred Route intersect. There is one tower located in the Albany area on Route D.

There are two AM Radio towers within the Sauk Centre to St Cloud portion of the project. One of the AM towers is located near Route D and the other is located less than a mile from the south side of the Quarry Substation.

7.5.3 Mitigation

The transmission line hardware would likely be designed and maintained to minimize gap and corona discharges. There is a potential for interference impacts to occur to omnidirectional communication towers. The height of the transmission line may interfere with beam paths. If interference occurs,

Applicants could work with the microwave tower owner to mitigate the impacts.

If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations can be restored by appropriate modification of (or addition to) the receiving antenna system. In addition, if isolated radio or television interference occurs because of the transmission line, the Applicants could work with the affected landowner to restore reception to pre-project quality.

If television or radio interference is caused by or from the operation of the proposed facilities in those areas where good reception is presently obtained, Applicants could inspect and repair any loose or damaged hardware in the transmission line, or take other necessary action to restore reception to the present level, including the appropriate modification of receiving antenna systems if deemed necessary.

In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants could work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

Digital reception is, in most cases, more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts. Although digital reception is more tolerant of RF noise, if the noise levels or reflections are great enough, they will impact digital television reception. In the rare occasion where the construction of the project may cause interference within a television station's primary coverage area, Applicants will work with the affected viewers to correct the problem, which can usually be corrected with the addition of an outside antenna.

7.6 ARCHAEOLOGICAL AND HISTORIC RESOURCES

7.6.1 Affected Environment

Definitions of terms clarify the meaning of locations as they relate to the project. The "project" refers to any action taken to construct or operate the transmission line. The "project route" refers to any of the potential routes being discussed at this time and the impact area of the transmission line whether from construction or operation. An 'archaeological resource' refers to any surface or buried resource showing past human activity. A 'historic architecture resource' refers to any standing post contact building or structure. The 'Applicants' refers to Xcel Energy and Great River Energy.

In May of 2009 the Applicants reviewed records in the Minnesota State Historic Preservation Office (SHPO) archaeological and historic architecture resource database. Records were reviewed to document previously identified resources within the project vicinity.

Regardless of the transmission line route selected, the Applicants should conduct a Phase I inventory of resources in the selected route. Project documentation should follow the guidelines set up in the "SHPO Manual for Archaeological Projects in Minnesota" and the "Guidelines for History/Architecture Projects in Minnesota." Documentation prepared in this manner will allow the permitting agency to adequately review and consider the impact of this project upon the resources identified within the project route.

The information generated for this section was compiled using the text from section 7.1.3, 7.2.3, and 8.7.4 of the "Application to the Minnesota Public Utilities Commission for a Route Permit for the Fargo to St. Cloud 345 kV Transmission Line Project, Docket # ET2, E002/TL-09-1056." The Applicants state previous cultural resource inventory report data is available. The inventory of the selected route includes a detailed discussion of previous cultural resources studies in the vicinity.

7.6.2 Potential Impacts

The Applicant Preferred Route contains no archaeological resources and 15 historic architecture resources. The historic architecture resources in this section of the route may contain multiple building(s) and/or structure(s) (known as the Anton Gogola Farmstead) listed on the NRHP. The remaining resources may be related to a bridge, a flour mill, a church, a log outbuilding, schools, and/or a music hall that have not undergone evaluation for inclusion in the NRHP.

Route E contains five previously recorded cultural resources. One of the resources is a previously recorded archaeological resource documented as a prehistoric artifact scatter. The other four resources are previously recorded historic architecture resources. Two of these historic architecture resources are represented as a township hall and a historic stage coach route. If this route is selected for use the other two historic architecture resources should be discussed as apart of the inventory survey/report.

Route A contains one previously recorded cultural resource. The resource is identified as a historic architecture resource. This one resource may be represented by a school (also mentioned in the Applicant Preferred Route section), a bridge, and/or the Lake Travers & Bois de Sioux Flood Control and Water project. The Lake Travers & Bios de Sioux Flood Control and Water Project is considered eligible for listing on the NRHP.

Routes: B, C, D, F, G, H, and Options: 8, 9, 10, 11, and 12 were developed after submittal of this permit application. Hence, no discussion of cultural resources has occurred for these routes or route options for this permit application. The possibility exists for one route with multiple route options to be selected as the final Route. If this is the case the Applicants could follow the process proposed in the Mitigation section below to adequately consider the resources in the final selected Route.

In the case that the undergrounding options for Route D are selected; the potential for impacts to archaeological resources is significantly higher. Therefore, it is recommended that all steps of the process described in the Mitigation section should be followed along with the inclusion of a specialist (such as a geomorphologist) to fully assess resources, impacts, and mitigation requirements. The specialist would need to document the culturally viable levels, the culturally

sterile levels, and discuss the potential for buried resources. Upon completion of this task, the Applicant should develop an archaeological survey in coordination with SHPO that adequately address the underground portion of route D for archaeological resources.

7.6.3 Mitigation

Impacts to archaeological resources occur from ground disturbing activity during construction or operation of the project. These impacts can harm the information potential of the resource. A total of 17 archaeological resources have been identified within the Applicant Preferred Route, Route A, and Route E. Impacts to the majority of these resources can be avoided by clear designation of the resource area, adjustments to the construction footprint, and designation of no construction and operation buffers around the resources. However, certain archaeological resources may be sensitive to visual intrusion. If such archaeological resources are identified within the project route the Applicants should coordinate with SHPO as to the sensitivity of this resource as it relates to the project action. Archaeological resource inventories should be completed in areas proposed for ground disturbance to identify undocumented archaeological resources. If an archaeological resource cannot be avoided, resource evaluation leading to specific treatment would be developed by the Applicants in coordination with SHPO, Office of the State Archaeologist (OSA), and the Minnesota Department of Commerce, Office of Energy Security (OES) to mitigate the adverse impact caused by this project.

Impacts to historic architecture resources can result from physical damage to the structure or from construction/operation of the project. Indirect impacts can result from visual intrusions of project elements on the historic character or historic setting of the historic architecture resource. A total of 14 historic architecture resources have been identified within the Applicant Preferred Route, Route A and Route E. Direct impacts to these resources can be avoided by identifying no construction and/or operation buffers, adjustment to project design so as to not impact the historic architecture resources physical makeup, and understand construction techniques so as to not harm historic architecture resource foundations. In addition, indirect impacts to historic architecture should be considered and treatment techniques should be developed in coordination with SHPO, OES, and possibly OSA. A discussion maybe needed with the regulating agencies concerning indirect impacts for any of the historic architecture resources that are listed or eligible for listing on the NRHP. If any historic architecture resource cannot be avoided, resource evaluation leading to specific treatment would be developed by the Applicants in coordination with SHPO, Office of the State Archaeologist (OSA), and the OES to mitigate the adverse impact caused by this project.

The Applicants do not anticipate physical impacts to previously identified archaeological or historic architecture resources within the Applicant Preferred Route, Route A and Route E as a result of project construction and/or operation. Avoidance will be used as a first step to mitigate impacts to archaeological and historic architecture resources. In the event that an impact occurs, coordination with SHPO, OSA, and OES would be needed and if applicable, further evaluation of the impacted resource to understand its eligibility for listing in the NRHP.

Upon selection of the final route the Applicants should sponsor a Phase Ia Literature Search of the review area (the review area is defined to be the project area plus one mile buffer around the

project boundary). This information, possibly combined with other supplementary information, will identify the types of additional archaeological or historic architecture resources that could be located within the selected route. The Applicants can then use this information to develop a survey methodology appropriate for locating such resources. SHPO and OSA should be engaged to elicit any specific knowledge they have concerning the selected route.

The Applicants should then sponsor a Phase I Reconnaissance Survey within the selected route to identify additional undocumented archaeological and historic architecture resources. Once these resources are identified and project effects to these resources are understood communication should occur between the Applicants, SHPO, OSA, and OES. The communication between the parties should center on the resources that will be impacted by the project action.

Once an evaluation strategy for the impacted resources is complete, the Applicants should sponsor a Phase II Intensive Survey at these identified locations, if needed. Those resources deemed significant and eligible for listing or listed on the NRHP will require treatment. These treatment plans should be developed by the Applicants in coordination with SHPO, OSA, OES, and any other identified applicable party.

If needed, the Applicants should sponsor a Phase III Treatment activity for identified resources that are eligible for listing or listed on the NRHP that will receive impact. The result of the Phase III Treatment activity will provide documentation that the treatment plan(s) were carried out and completed in full.

7.7 LAND-BASED ECONOMIES

7.7.1 Affected Environment

The primary land based economy in the area of the project is agriculture. Agricultural impacts are an important issue with respect to economics, soil, and land use. This section discusses the potential project impacts on agriculture, as well as forestry, tourism, and mining.

Agriculture

According to the U.S. Department of Agriculture 2007 Census of Agriculture (UDSA, 2009) primary crops in the Project area are corn, soybeans, oats, wheat, sugar beets, and hay. Primary livestock found within the Project area include dairy cattle, beef cattle, sheep, swine, and poultry. Table 7.7-1 illustrates the number of farms, average farm size, acres of farmland, market value of agricultural products, and market value of agricultural products per acre of farmland for Stearns County.

Table 7.7-1. Agricultural Production within Project Area in Stearns County

County	Number of Farms	Average Farm Size (acres)	Acres of Farmland	Market Value of Agricultural Products (millions of dollars)	Market Value of Agricultural Products per Acre of Farmland (dollars)
Stearns	3,368	210	708,284	$519	$733

The majority of lands within the proposed routes between Sauk Centre and St. Cloud are zoned for agriculture. Refer to Table 7.7-2 below for the percentage of land zoned for agriculture in each route, route option, and post scoping option.

Table 7.7-2. Percent of Land Zoned Agricultural (Route)

Route/Option	Percent of Route Zoned Agriculture	Percent of Route Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred Route	92	
Route A	93	-
Route B	97	-
Route C	91	-
Route D	80	-
Route E	92	-
Route F	77	0.03
Route G	94	-
Route H	93	-
Route Options		
Option 8 Area		
Applicant Preferred Route	90	-
Option 8	100	-
Option 9 Area		
Applicant Preferred ROW Occupancy	93	-
Applicant Preferred No ROW Occupancy	93	-
Option 9	89	-
Option 10 Area		
Route A	94	-
Option 10	100	-
Option 11 Area		
Route E	88	-
Option 11	85	15
Option 12		
Route E	81	-
B Segments	84	-
Amended Scope Options		
Route D/E*	84	-
AS-4	100	-
AS-5	79	-

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Nearly every route between Sauk Centre and St. Cloud has more than 90 percent of lands within the proposed route zoned for agriculture. Route F and Route D include the least amount of land zoned for agriculture at approximately 77 percent.

The proposed route options also impact primarily agriculturally zoned lands. Options 8 and 10 impact more agricultural lands than their alternatives; the Applicant Preferred Route and

Route A. Option 9 impacts four percent fewer lands zoned for agriculture than the Applicant Preferred ROW Occupancy and No ROW Occupancy. Option 11 impacts three percent fewer lands zoned for agriculture than its alternate Route E. Option 12 impacts three percent more lands zoned for agriculture than Route E. Finally, AS-4 is a wider area adjacent to Route E that is located in an area zoned 100 percent for agriculture and AS-5 would impact two percent fewer lands zoned for agriculture than the D/E segments.

During public outreach meetings for the Project, some landowners expressed concerns with whether high voltage transmission lines could interfere with electromagnetically guided cornering systems that some center pivot irrigation systems utilize. A study published in the Institute of Electronics and Electrical Engineers Transactions on Power Delivery (Olsen and Heins, 1998) found that the level and frequency of magnetic fields required to cause interference with the electromagnetically guided cornering systems is significantly higher than found near most high voltage transmission lines. Refer to Table 5.7-3. below for the number of center pivot irrigation systems found in each route, route options, and post scoping options.

Table 7.7-3. Center Pivot Irrigation Systems by Route (Sauk Centre to St. Cloud)

Route/Option	Number of Center Pivot Irrigation Systems in Route
Route Alternatives	
Applicant Preferred Route	4
Route A	2
Route B	0
Route C	2
Route D	2
Route E	11
Route F	2
Route G	11
Route H	17
Route Options	
Option 8 Area	
Applicant Preferred Route	0
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	1
Applicant Preferred No ROW Occupancy	1
Option 9	0
Option 10 Area	
Route A	0
Option 10	0
Option 11 Area	
Route E	6
Option 11	1
Option 12	
Route E	0
B Segments	0
Amended Scope Options	
Route D/E *	0
AS-4	0
AS-5	0

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

The Applicant Preferred Route impacts two more center pivot irrigation systems than Route A. Route B does not impact any center pivot irrigation systems and Routes C, D, and F impact two center pivot irrigation systems. Routes E and F impact 11 center pivot irrigation systems and Route H impacts the greatest number of center pivot irrigation systems with 17 impacts. None of the route options or post scoping options impact any center pivot irrigation systems.

Prime Farmland

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides soil surveys with detailed soil geographic data developed by the National Cooperative Soil Survey. The purpose of the data is to provide consistent soil mapping data and provides an inventory of important farmlands. Agricultural land designated as 'prime farmland,' indicates land that is most desirable for agricultural production. According to Federal regulation prime farmland is defined as, "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses" (7 CFR, 657.5 (a) (1)). Further land that is designated as 'farmland of statewide importance' is, "land; in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods" (7 CFR, 657.5 (c). Refer to Table 7.7-4 for the acreage of prime farmland within the proposed routes, route options, and post scoping options.

Table 7.7-4. Acreage of Prime Farmland within Route and Option Alternatives

Route/Option	Prime Farmland in Route (Acres)
Route Alternatives	
Applicant Preferred Route	3,068
Route A	3,539
Route B	2,490
Route C	1,592
Route D	1,107
Route E	1,866
Route F	1,586
Route G	1,716
Route H	1,157
Route Options	
Option 8 Area	
Applicant Preferred Route	17
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	112
Applicant Preferred No ROW Occupancy	112
Option 9	142
Option 10 Area	
Route A	51
Option 10	23
Option 11 Area	
Route E	170
Option 11	119
Option 12	
Route E	9
B Segments	13
Amended Scope Options	
Route D/E *	9
AS-4	312
AS-5	0

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Forestry

The proposed routes and options are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within MnDNR managed lands. The wooded areas are located primarily on privately held lands. The wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these

wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state.

Refer to Table 7.7-5 below for the acreage of wooded lands the proposed routes between Sauk Centre and St. Cloud.

Table 7.7-5. Wooded Lands by Route (Sauk Centre to St. Cloud)

Route/Option	Wooded Lands in Route (Acres)
Route Alternatives	
Applicant Preferred Route	1,920
Route A	1,870
Route B	819
Route C	810
Route D	640
Route E	759
Route F	669
Route G	721
Route H	743
Route Options	
Option 8 Area	
Applicant Preferred Route	1
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	56
Applicant Preferred No ROW Occupancy	56
Option 9	33
Option 10 Area	
Route A	7
Option 10	13
Option 11 Area	
Route E	131
Option 11	75
Option 12	
Route E	52
B Segments	51
Amended Scope Options	
Route D/E *	51
AS-4	52
AS-5	52

NCLD, 2001

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Tourism

The majority of tourism activities or opportunities along the proposed routes and Route Options are associated with recreational uses. Refer to section 7.3 for a discussion of recreational uses along the proposed routes between Sauk Centre and St. Cloud.

Mining

In 1984, Minnesota Statues Section 84.94 was passed, which required each county in Minnesota to identify and protect aggregate resources. Since then, counties in Minnesota have begun to identify areas of potential mining and develop long-term comprehensive plans that incorporate aggregate resources (MnDNR, 2009a). No counties in the Sauk Centre and St. Cloud area have complete mapping of Aggregate Resources by the MnDNR. Stearns County mapping is in progress. Due to the incompleteness of the mapping across the Project area, aggregate resources in the Project area were identified using the Mn/DOT Aggregate Source Information System, which is a database of aggregate sources that are depicted on County Pit Maps. County Pit Maps show the locations of gravel pits, rock quarries, and commercial aggregate sources. The maps were completed prior to 2003 and there are no plans to update the maps.

Table 7.7-6 depicts the aggregate sources located in each route based on the Aggregate Source Information System database.

Table 7.7-6. Aggregate Sources (Sauk Centre to St. Cloud)

Route/Option	Total Number of Aggregate Sources in Route	Aggregate Source Status			
		Source Status Prospected Pit	Inactive Aggregate Source	Commercial Aggregate Source	Mn/DOT owned or managed Aggregate Source
Route Alternatives					
Applicant Preferred Route	5	4	1	-	-
Route A	0	-	-	-	-
Route B	0	-	-	-	-
Route C	5	4	1	-	-
Route D	9	6	2	1	
Route E	6	4	1	1	-
Route F	7	5	1	-	1
Route G	6	4	1	1	-
Route H	6	4	1	1	-
Route Options					
Option 8 Area					
Applicant Preferred Route	0	-	-	-	-
Option 8	0	-	-	-	-
Option 9 Area					
Applicant Preferred Route	1	-	1	-	-
Option 9	2	2	-	-	-
Option 10 Area					
Route A	0	-	-	-	-
Option 10	0	-	-	-	-
Option 11 Area					
Route E	0	-	-	-	-
Option 11	0	-	-	-	-
Option 12					
Route E	1	-	-	1	-
B Segments	0	-	-	-	-
Amended Scope Options					
Route D/E *	1	-	-	1	-
AS-4	0	-	-	-	-
AS-5	0	-	-	-	-

Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.

Details regarding aggregate resources include the following:

- Four of the aggregate sources in the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments are prospected aggregate pits near Melrose and Sauk Centre and the other source is an inactive source near Melrose.
- The aggregate sources for Route C are the same as the Applicant Preferred Routes.
- Six of the nine aggregate sources in Route D are prospected aggregate pits near Avon, Melrose, and Sauk Centre. Two of the sources are inactive aggregate sources near Albany and Melrose and one is a commercial aggregate source in St. Joseph.
- Four of the six aggregate sources in Route E are prospected aggregate pits near Melrose and Sauk Centre. One of the sources is an inactive source near Melrose and one is a commercial aggregate source in St. Joseph.
- Five of the seven aggregate sources in Route F are prospected aggregate pits near Rockville, Melrose, and Sauk Centre. One of the sources is an inactive source near Melrose and one is a Mn/DOT owned aggregate pit that is now located within a right-of-way in Cold Spring.
- Route G and Route H impacts are identical to Route E impacts.

7.7.2 Potential Impacts

This section presents the potential impacts to land based economies for the project in the area between Sauk Centre and St. Cloud.

Agriculture

The majority of the lands in the area between Sauk Centre and St. Cloud are agricultural. Refer to Table 6.7-7. below for percentage of lands zoned for agriculture and Table 6.7-8. for the number of center pivot irrigation systems within each ROW for the proposed route, route options, and post scoping options followed by a discussion of these impacts.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. Impacts associated with the proposed routes and options assume 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other work areas. Temporary impacts are estimated at a rate of one acre per pole. Refer to Table 7.7-9 for the temporary and permanent impact associate with each route, route option, and post scoping option followed by a discussion of these impacts.

Table 7.7-7. Percent of Land Zoned Agricultural (Alignment ROW)

Route/Option	Percent of ROW Zoned Agriculture	Percent of ROW Zoned Special Protection Agriculture
Route Alternatives		
Applicant Preferred ROW Occupancy	93	
Applicant Preferred No ROW Occupancy	94	
Route A	96	-
Route B	97	-
Route C	91	-
Route D	77	-
Route E	96	-
Route F	77	0.04
Route G	97	-
Route H	96	-
Route Options		
Option 8 Area		
Applicant Preferred Route	94	-
Option 8	75	-
Option 9 Area		
Applicant Preferred ROW Occupancy	89	-
Applicant Preferred No ROW Occupancy	89	-
Option 9	90	-
Option 10 Area		
Route A	100	-
Option 10	100	-
Option 11 Area		
Route E	88	-
Option 11	83	17
Option 12		
Route E	100	-
B Segments	56	-
Amended Scope Options		
Route D/E *	100	-
AS-4	NA*	-
AS-5	79	-

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*
Option AS-4 is a wide area without a centerline or alignment, however 100% of the area is zoned for agriculture as is Route E in this area..

Table 7.7-8. Center Pivot Irrigation Systems by Within ROW

Route/Option	Number of Center Pivot Irrigation Systems in ROW
Route Alternatives	
Applicant Preferred ROW Occupancy	2
Applicant Preferred No ROW Occupancy	2
Route A	2
Route B	0
Route C	0
Route D	0
Route E	2
Route F	0
Route G	2
Route H	6
Route Options	
Option 8 Area	
Applicant Preferred Route	0
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 9	0
Option 10 Area	
Route A	0
Option 10	0
Option 11 Area	
Route E	1
Option 11	0
Option 12	
Route E	0
B Segments	0
Amended Scope Options	
Route D/E *	0
AS-4	0
AS-5	0

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Table 7.7-9. Temporary and Permanent Impacts to Agriculture

Route/Option	Estimated Number of Poles	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (1,000 SF Per Pole) SF	Permanent Impacts (1,000 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	210	210	209,706	4.82
Applicant Preferred No ROW Occupancy	214	214	214,221	4.92
Route A	233	233	233,276	5.35
Route B	227	227	226,945	5.2
Route C	173	173	172,863	3.97
Route D	164	164	164,218	3.77
Route E	228	228	228,107	5.24
Route F	235	235	234,719	5.39
Route G	236	236	236,208	5.43
Route H	233	233	232,551	5.34
Route Options				
Option 8 Area				
Applicant Preferred Route	4	4	4,242	0.1
Option 8	0	0	0	0
Option 9 Area				
Applicant Preferred ROW Occupancy	27	27	26,678	0.61
Applicant Preferred No ROW Occupancy	28	28	27,606	0.64
Option 9	21	21	20,772	0.47
Option 10 Area				
Route A	9	9	8,743	0.2
Option 10	8	8	8,375	0.19
Option 11 Area				
Route E	18	18	17,668	0.4
Option 11	19	19	18,640	0.43
Option 12				
Route E	3	3	2,952	0.07
B Segments	1	1	1,474	0.03
Amended Scope Options				
Route D/E *	8	8	7,771	0.18
AS-4	16*	16*	16,384*	0.38*
AS-5	13	13	13,183	0.30

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5. AS-4 is a wider area with out an alignment or ROW. This area is agricultural, to traverse the area the approximate number of poles and impacts is provided. Source: NCLD, 2001*

Applicant Preferred Route

Ninety-three percent of the lands occurring within the Applicant Preferred ROW Occupancy alignment are zoned for agriculture and ninety-four percent of lands within the No ROW Occupancy alignment between Sauk Centre and St. Cloud are zoned for agriculture. Two of the center pivot irrigation systems are located in the Applicant Preferred ROW Occupancy alignment and two center pivot irrigation systems are located in the No ROW Occupancy alignment between Sauk Centre and St. Cloud.

Permanent impacts on agricultural land can include loss of agricultural land due to pole placement. The permanent impacts associated with the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation) and crop damages within the right-of-way at proposed structure location, locations of permanent access, and other work areas. Temporary impacts are estimated at approximately 210 acres for the Preferred Route ROW Occupancy alignment and 214 acres for the No ROW Occupancy alignment, based on a rate of one acre per pole.

Route A

Ninety-six percent of the lands within the Route A ROW are zoned for agriculture. Two of the center pivot irrigation systems are located in the Route A ROW.

The permanent impacts associated with Alternate Route A between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 233 acres, based on a rate of one acre per pole.

Route B

Ninety-seven percent of the lands within the Route B ROW are zoned for agriculture. There are no center pivot irrigation systems are located in the Route B ROW.

The permanent impacts associated with Alternate Route B between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 227 acres, based on a rate of one acre per pole.

Route C

Ninety-one percent of the lands within the Route C ROW are zoned for agriculture. There are no center pivot irrigation systems are located in the Route C ROW.

The permanent impacts associated with Alternate Route C between Sauk Centre and St. Cloud represent approximately four acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 173 acres, based on a rate of one acre per pole.

Route D

Seventy-seven percent of the lands within the Route D ROW are zoned for agriculture. There are no center pivot irrigation systems are located in the Route D ROW.

The permanent impacts associated with Alternate Route D between Sauk Centre and St. Cloud represent approximately four acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 164 acres, based on a rate of one acre per pole.

Route D Undergrounding

Because the ROW width is only 60 feet compared to 150 feet less lands zoned for agriculture lie within by the portions of Route D that are proposed for undergrounding. The primary difference in impacts between above ground and undergrounding in areas that are zoned for agriculture is that the undergrounding option would require a permanent 60 foot easement that would prohibit any agricultural land use or agricultural production in that easement. The above ground option would still permit agricultural land use and production in the 150 ROW except at pole locations where a 1,000 SF area would be permanently removed from agricultural land uses and production. No center pivot irrigation systems are located within any of the proposed undergrounding option ROWs.

The undergrounding option near Freeport would include two acres of lands zoned for agriculture in its proposed ROW. However, there is a difference between lands that are zoned for agriculture and lands that are in agricultural production. To assess lands in agricultural production, the NLCD Land Cover Classification System Land Cover Class data set was applied. For the above ground option in this location, seven poles would be required and would temporarily impact approximately 7 acres of lands used for pasture/hay, row crops, or small grains. The poles would permanently impact approximately 0.17 acres of lands used for pasture/hay, row crops, or small grains. The undergrounding permanent 60 foot easement would permanently impact approximately eight acres of lands used for pasture/hay, row crops, or small grains.

The undergrounding option near Albany does not include any land zoned for agriculture. However, as noted previously, there is a difference between lands that are zoned for agriculture and lands that are in agricultural production. For the above ground option in this location, eight poles would be required and would temporarily impact approximately eight acres of lands used for pasture/hay, row crops, or small grains. The poles would permanently impact approximately 0.18 acres of lands used for pasture/hay, row crops, or small grains. The undergrounding permanent 60 foot easement would permanently impact approximately nine acres of lands used for pasture/hay, row crops, or small grains.

The undergrounding option between Avon and St. Joseph would include 55 acres of lands zoned for agriculture in its proposed ROW. For the above ground option in this location, would temporarily impact approximately 44 acres of lands used for pasture/hay, row crops, or small grains. The poles would permanently impact approximately one acre of lands used for pasture/hay, row crops, or small grains. The undergrounding permanent 60 foot linear easement would impact approximately 49 acres of lands used for pasture/hay, row crops, or small grains.

Route E

Ninety-six percent of the lands within the Route E ROW are zoned for agriculture. There are two center pivot irrigation systems are located in the Route E ROW.

The permanent impacts associated with Alternate Route E between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 228 acres, based on a rate of one acre per pole.

Route F

Seventy-seven percent of the lands within the Route F ROW are zoned for agriculture with 0.04 percent zoned for special protection agriculture. There are no center pivot irrigation systems are located in the Route F ROW.

The permanent impacts associated with Alternate Route F between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 235 acres, based on a rate of one acre per pole.

Route G

Ninety-seven percent of the lands within the Route G ROW are zoned for agriculture. There are two center pivot irrigation systems are located in the Route G ROW.

The permanent impacts associated with Alternate Route G between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 236 acres, based on a rate of one acre per pole.

Route H

Ninety-six percent of the lands within the Route H ROW are zoned for agriculture. There are six center pivot irrigation systems are located in the Route H ROW.

The permanent impacts associated with Alternate Route H between Sauk Centre and St. Cloud represent approximately five acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 233 acres, based on a rate of one acre per pole.

Option 8

Seventy-five percent of the lands within the Option 8 ROW are zoned for agriculture whereas ninety-four percent of the lands in the Preferred Route are zoned for agriculture. There are no center pivot irrigation systems within the Option 8 ROW. Route Option 8 has no temporary or permanent impacts to agriculture due to pole placement whereas the Applicant Preferred Route temporarily impacts four acres and permanently impacts approximately 0.1 acres of agricultural land cover.

Option 9

Ninety percent of the lands within the Option 9 ROW are zoned for agriculture which is only one percent greater than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments. There are no center pivot irrigation systems within the Option 8 ROW.

The permanent impacts associated with Option 9 between Sauk Centre and St. Cloud represent approximately 0.5 acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 21 acres, based on a rate of one acre per pole. These temporary and permanent impacts are less than the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments.

Option 10

One hundred percent of both Option 10 and Route A are zoned for agriculture at this location. There are no center pivot irrigation systems within the Option 8 ROW.

The permanent impacts associated with Option 10 between Sauk Centre and St. Cloud represent approximately 0.2 acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 8 acres, based on a rate of one acre per pole. These temporary and permanent acres are approximately the same as the Route A ROWs, except Option 10 has one less acre of temporary impacts.

Option 11

Eighty-eight percent of the lands within the Option 11 ROW are zoned for agriculture and includes an additional 17 percent zoned as special agriculture. Route E impacts five percent more lands zoned for agriculture but does not impact any special agriculture. There are no center pivot irrigation systems in Option11, however, Route E does include one center pivot irrigation system in this area.

The permanent impacts associated with Option 11 between Sauk Centre and St. Cloud represent approximately 0.4 acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 19 acres, based on a rate of one acre per pole. These temporary and permanent acres are approximately the same as the Route E ROWs, except Option 11 has one additional acre of temporary impacts.

Option 12

Option 12 compares utilizing Route E which is zoned 100 percent for agriculture with Route Options B4/ B5 which represents 56 percent agriculture lands in its ROW. There are no center pivot irrigation systems within either ROW.

The permanent impacts associated with both alternatives in Option 12 between Sauk Centre and St. Cloud are less than a tenth of an acre, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 1 acre for the B segments and three acres for Route E, based on a rate of one acre per pole.

Amended Scope Options

AS-4 is a wider area rather than a traditional alignment with a ROW but is entirely zoned for agriculture. There are no center pivot irrigation systems in this area. If a transmission line were to travel across this area it would require approximately sixteen poles therefore it can be surmised that 0.4 acres of land would be permanently impacted by using this area and 16 acres would be temporary impacted.

Seventy-nine percent of the lands in the AS-5 ROW are zoned for agriculture whereas 100% of the alternate option would be located in an area zoned 100% for agriculture. There are no center pivot irrigation systems in this location. These permanent impacts associated with AS-5 between Sauk Centre and St. Cloud are estimated at approximately 0.3 acres, assuming that 1,000 square feet per pole will be permanently impacted. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation), and crop damages within the right-of-way at proposed structure locations, locations of access to the right-of-way, and other work areas. Temporary impacts are estimated at approximately 13 acres for AS-5 based on a rate of one acre per pole. The temporary and permanent impacts from AS-5 are greater than the alternative even though it has fewer lands zoned for agriculture it actually includes more lands in agricultural production.

Prime Farmland

Prime farmland resources are an important contribution to the land based economics of the counties between Sauk Center and St. Cloud. Agricultural land designated as 'prime farmland,' indicates land that is most desirable for agricultural production based on soil mapping. Refer to Table 7.7-10 for the acreage of prime farmland within the proposed route and route option ROWs.

Table 7.7-10. Acreage of Prime Farmland within Route and Option ROW

Route/Option	Prime Farmland in ROW (Acres)
Route Alternatives	
Applicant Preferred ROW Occupancy	270
Applicant Preferred No ROW Occupancy	272
Route A	354
Route B	389
Route C	226
Route D	179
Route E	268
Route F	238
Route G	246
Route H	162
Route Options	
Option 8 Area	
Applicant Preferred Route	3
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	0
Applicant Preferred No ROW Occupancy	0
Option 9	23
Option 10 Area	
Route A	7
Option 10	5
Option 11 Area	
Route E	22
Option 11	17
Option 12	
Route E	0
B Segments	6
Amended Scope Options	
Route D/E*	0
AS-4	0
AS-5	0

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*
Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2005.

Table 7.7-11. Acreage of Prime Farmland within Route D Above Ground and Underground Options

Route	Prime Farmland in Underground ROW 60' (Acres)	Prime Farmland in Above Ground ROW 150' (Acres)
Underground Options		
Route D Undergrounding Freeport Area	5	13
Route D Undergrounding Albany Area	3	8
Route D Undergrounding Avon Area	13	33

Source: U.S. Department of Agriculture, Natural Resources Conservation Service, 2005.

Forestry

The proposed routes are located primarily in grassland and cultivated land with some forested areas adjacent to farmsteads, waterways, and within MnDNR managed lands. Forest resources, notably tree stands, are present along the proposed routes. Refer to Table 7.7-12 for the acreage of wooded lands within each ROW for route options between Sauk Centre and St. Cloud.

Table 7.7-12. Wooded Lands in Proposed ROW for Routes

Route/Option	Wooded Lands in ROW (Acres)*
Route Alternatives	
Applicant Preferred ROW Occupancy	132
Applicant Preferred No ROW Occupancy	131
Route A	125
Route B	113
Route C	110
Route D	83
Route D Undergrounding Freeport	0.3
Route D Undergrounding Albany	0.4
Route D Undergrounding Avon	11
Route E	72
Route F	80
Route G	78
Route H	78
Route Options	
Option 8 Area	
Applicant Preferred Route	0
Option 8	0
Option 9 Area	
Applicant Preferred ROW Occupancy	6
Applicant Preferred No ROW Occupancy	4
Option 9	3
Option 10 Area	
Route A	0
Option 10	2
Option 11 Area	
Route E	11
Option 11	11
Option 12	
Route E	4
B Segments	8
Amended Scope Options	
Route D/E*	5
AS-4	0
AS-5	2

**Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*
All above ground routes include a 150 foot ROW whereas the underground route includes a 60' ROW.
Source: NCLD, 2001

The wooded areas are located primarily on privately held lands. Wooded areas that are privately owned may be selectively cut periodically for firewood, timber, or pulpwood. However, these wooded areas are not necessarily commercial forestry operations. The majority of the forest industry is located within the northeastern portion of the state. According to the MnDNR, Forestry Division, Fiscal Year 2010 Harvest Plans (MnDNR, 2009b) no townships within the proposed routes or Route Options have timber harvest plans. Impacts on forest resources will occur at locations where trees will be cleared within the right-of-way.

The Applicant Preferred ROW Occupancy and No ROW Occupancy, and Route C impact the greatest amount of wooded lands. Route E impacts the least amount of wooded lands. Route Options 9 and 11 impact wooded lands the same as their alternate routes. The undergrounding options for Route D would permanently impact a smaller ROW and therefore less wooded areas than in locations where Route D would be above ground. Option 9 represents a reduction in impacts over the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments. Option 10 has more impacts on wooded lands than Route A. Option 12 utilizing the B segments has greater impacts on wooded lands than Route E. Finally, AS-5 would have fewer impacts than using the alternate route to the Quarry substation.

Tourism

No impacts to tourism are anticipated between Sauk Centre and St. Cloud. The majority of tourism activities or opportunities along the Applicant Preferred Route, Route A and Route Options between Sauk Centre and St. Cloud are associated with recreational uses. Refer to section 7.3 for a discussion of recreational uses along the proposed routes. No impacts are anticipated and therefore no mitigative measures are proposed.

Mining

There is one aggregate source located in the assumed alignment for the Applicant Preferred ROW Occupancy alignment and one aggregate source located in the proposed ROW for the Applicant Preferred No ROW Occupancy alignment. Additionally, there is one aggregate source located in Route C and Route D, three in Route E, one in Route F, two in Route G, two in Route H, and one in Route Option 12 Route E. Refer to Table 7.7-13 below for a list of aggregate sources, their location and status.

Table 7.7-13. Aggregate Source Impacts by ROW

Route	Aggregate Source Number	County	Location	Nearest City	Status
Applicant Preferred Route ROW Occupancy	73133	Stearns	E1/2 SE1/4	Melrose	P
Applicant Preferred Route No ROW Occupancy	73133	Stearns	E1/2 SE1/4	Melrose	P
Route C	73133	Stearns	E1/2 SE1/4	Melrose	P
Route D	73133	Stearns	E1/2 SE1/4	Melrose	P
Route E	73166	Stearns	W1/2 NE1/4	St. Joseph	C
Route E	73133	Stearns	E1/2 SE1/4	Melrose	P
Route F	73133	Stearns	E1/2 SE1/4	Melrose	P
Route G	73166	Stearns	W1/2 NE1/4	St. Joseph	C
	73133	Stearns	E1/2 SE1/4	Melrose	P
Route H	73166	Stearns	W1/2 NE1/4	St. Joseph	C
	73133	Stearns	E1/2 SE1/4	Melrose	P
Option 12 Route E	73166	Stearns	W1/2 NE1/4	St. Joseph	C

A - Aggregate Pit (has been prospected and/or leased by Mn/DOT. Does not necessarily imply that the source is actually producing aggregate at the present time).

C - Commercial Aggregate (identified commercial source of aggregate on property that has never been prospected by Mn/DOT. These sources are often used for concrete aggregate).

Of the proposed routes only Route A has no aggregate sources located within its proposed ROW. The remaining route ROWs only impact one aggregate source except in the case of Route G and Route H which both impact a total of two aggregate sources. Overall impacts to aggregate sources are minimal and would likely be avoided therefore no mitigation is proposed. Of the route options and post scoping options there are no aggregate sources located within the proposed ROWs. However, Route E in Option 12 would impact one aggregate source that would not be impacted by the B4/B5 alignment option. Further, while AS-5 does not impact any aggregate sources, the alternative route to the project terminus would impact one aggregate source as indicated in the table above for Route E.

7.7.3 Mitigation

Agriculture and Prime Farmland

Together with the Department of Agriculture and other parties, Applicants have developed an Agricultural Impact Mitigation Plan to identify measures the utilities will take to avoid, mitigate, repair, and/or provide compensation for impacts that may result from construction of the proposed transmission facilities. A copy of the final plan is included in Appendix G.

Landowners will be compensated for the use of their land through easement payments. To minimize loss of farmland and to ensure reasonable access to the land near the poles, Applicants would prefer to place the poles approximately five feet from the road right-of-way, except for locations adjacent to Mn/DOT right of way where the poles would likely be placed 25 feet from

the road right of way. When possible, Applicants will attempt to construct the transmission line before crops are planted or following harvest. Applicants will compensate landowners for crop damage and soil compaction that occurs as a result of the Project. Soil compaction will be addressed by compensating the farmer to repair the ground or by using contractors to chisel-plow the site. Normally, a declining scale of payments is set up over a period of a few years.

To further minimize agricultural impacts where possible, spring time construction will be avoided. However, if construction during spring is necessary, disturbance to farm soil from access to each structure location will be minimized by using the shortest access route feasible or practicable. This may require construction of temporary driveways between the roadway and the structure but will limit traffic on fields between structures. Construction mats may also be used to minimize impacts on the access paths and in construction areas.

Some landowners use GPS navigation systems on farm equipment. Once the Project is complete, the transmission line poles will have GPS coordinates that Applicants may provide to the landowners, if requested.

Tile lines may be present along the transmission line route. Applicants will work with the landowners to identify locations of drainage tiles along the route and will minimize interference with tiling, where possible. In the event that Applicants locate a tile line that the landowner did not discuss, Applicants will relocate the pole and repair the tile line, if damaged.

Crop dusting may occur within agricultural fields along the route. If this farming practice is utilized, and has the potential to become impacted by the Project, Applicants will work with the landowner to identify mitigative measures to avoid or reduce changes to farming practices caused by the Project.

Forestry

No impacts on commercial forest resources will occur. Impacts on wooded lands have been minimized by locating the proposed routes to minimize tree clearing to the extent feasible. As a result, no mitigative measures are proposed.

Mining

No impacts on aggregate will occur.

7.8 WATER RESOURCES

This section discusses the water resources in the project area between Sauk Centre and St. Cloud, Minnesota and the potential impacts on these resources.

7.8.1 Affected Environment

Water resources evaluated in this section includes surface water, ground Water, wetlands, and floodplains.

The proposed project routes cross one major water resource region (watersheds), as defined by the USGS. The proposed routes cross the Upper Mississippi Region (07) which ultimately drains into the Gulf of Mexico. Within these regions the proposed routes cross two smaller watersheds.

Table 7.8-1 contains a list of all the 8-digit Hydrologic Unit Codes HUC 8 watersheds crossed by the proposed routes and route options.

Table 7.8-1. Watersheds (HUC 8) Crossed by the Proposed Routes and Route Options

Watershed Name	Hydrologic Unit Code
Sauk River	07010202
Platt-Spunk	07010201

Surface Water

The Project occurs in an area covered with several surface water resources. Surface water resources are defined as both lakes and surface flows (rivers and streams) within the project area.

Several streams, rivers, and lakes occur within the proposed routes. The Applicant Preferred Route and associated Route Options cross a total of 11 intermittent surface flows and 20 perennial surfaces flows, 13 of which are Public Water Inventory (PWI waters which have specific protections under Minn. Rules)surface flows. Named PWI surface flows crossed by the Applicant Preferred Route include; the Sauk River, South Two River, Watab River South Fork, Getchell Creek, Spunk Creek, Stearns County Drainage Ditch 12, and Stearns County Drainage Ditch 17. The Applicant Preferred Route also contains six named PWI water bodies; Lower Watab, Shepard, Pine, Freeport, Uhlenkots Lakes, and the Great Belclair Marsh.

Route A and associated route options cross a total of 28 intermittent surface flows, one of which is a PWI surface flow, and 17 perennial surfaces flows, 14 of which are PWI surface flows. Named PWI surface flows crossed by Route A include; the Sauk River, South Two River, Watab River South Fork, Adley Creek, Spunk Creek, Stearns County Drainage Ditch 12, and Stearns County Drainage Ditch 17. Route A also contains four named PWI water bodies; Lower Watab, Sylvia, Mud Lakes, and the Great Belclair Marsh.

Route B crosses a total of 31 intermittent surface flows, one of which is a PWI surface flow, and 16 perennial surfaces flows, 12 of which are PWI surface flows. Named PWI surface flows crossed by Route B include; the Sauk River, South Two River, Watab River North Fork, Watab River South Fork, Adley Creek, and Spunk Creek. Route B also contains fournamed PWI water bodies; Swamp, Mud, Sylvia Lakes, and the Great Belclair Marsh.

Route C crosses a total of 17 intermittent surface flows, one of which is a PWI surface flow, and eight perennial surfaces flows, eight of which are PWI surface flows. Named PWI surface flows crossed by Route C include; the Sauk River, South Two River, Watab River North Fork, Watab River South Fork, Getchell Creek, Spunk Creek, and Stearns County Drainage Ditch 25. Route C also contains two named PWI water bodies; Freeport and Achman Lakes.

Route D crosses a total of 24 intermittent surface flows and 15 perennial surfaces flows, 10 of which are PWI surface flows. Named PWI surface flows crossed by the Route D include; the Sauk River, Watab River North Fork, Watab River South Fork, Spunk Creek, Getchell Creek, Stearns County Drainage Ditch 25, and Stearns County Drainage Ditch 17. Route D also

contains four named PWI water bodies; Uhlenkots, Middle Spunk, Big Spunk, and Minnie Lakes.

Route E and associated route options cross a total of 35 intermittent surface flows, two of which are PWI surface flows, and 26 perennial surfaces flows, 12 of which are PWI surface flows. Named PWI surface flows crossed by Route E include; the Sauk River, Watab River South Fork, West Getchell Creek, Getchell Creek, and Stearns County Drainage Ditch 17. Route E also contains nine named PWI water bodies; the Great Belclair Marsh, Mud, Little Rice, Big Rice, Japp, Henry, Sand, Oak, and Uhlenkolts Lakes .

Route F crosses a total of 36 intermittent surface flows, two of which are PWI surface flows, and 18 perennial surfaces flows, 12 of which are PWI surface flows. Named PWI surface flows crossed by Route F include; the Sauk River, Mill Creek, West Getchell Creek, Getchell Creek, and Stearns County Drainage Ditch 17. Route F also contains five named PWI water bodies; Uhlenkolts, Oak, Becker, Thein Lakes, and the Great Belclair Marsh.

Route G crosses a total of 38 intermittent surface flows, two of which are PWI surface flows, and 19 perennial surfaces flows, 12 of which are PWI surface flows. Named PWI surface flows crossed by the Route G include; the Sauk River, Watab River South Fork, Getchell Creek and Stearns County Drainage Ditch 17. Route G also contains one PWI water body, Ulhenklots Lake.

Route H crosses a total of 52 intermittent surface flows, four of which are a PWI surface flow, and 18 perennial surface flows, 11 of which are PWI Surface Flows. Named PWI surface flows crossed by Route H include; the Sauk River, Watab River South Fork, Getchell Creek, and Stearns County Drainage Ditch 17. The Preferred Route also contains one PWI water body, Frevels Lake. Surface flows and lakes contained in the proposed routes are shown on detailed maps in Appendix H.

Section 303(d) of the federal CWA requires states to publish, every two years, a list of streams and lakes that are not meeting their designated uses because of excess pollutants; these are also referred to as impaired waters. The list, known as the 303(d) list, is based on violations of water quality standards. In Minnesota, the Minnesota Pollution Control Agency (MPCA) has jurisdiction over determining 303(d) waters. Several of the Surface Waters located within the proposed routes and route options are on the 303(d) list. Table 7.8-2 contains a list of impaired waters contained within the proposed routes, along with the causes of impairment based on the 2008 MPCA 303(d) list.

Table 7.8-2. Impaired Water Crossed or within the Proposed Routes and Route Options

Watercourse Name	Impairment
Route Alternatives	
Applicant Preferred Route	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Spunk Creek	Fecal Coliform
Route A	
Sauk River	Mercury
Spunk Creek	Fecal Coliform
Route B	
Sauk River	Mercury
Spunk Creek	Fecal Coliform
Route C	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Spunk Creek	Fecal Coliform
Route D	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Route E	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Route F	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Mill Creek	Fecal Coliform
Route G	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Route H	
Sauk River	Mercury
Getchell Creek	Invertebrate Index of Biological Integrity
Mill Creek	Fecal Coliform
Route Options	
Option 9	
Sauk River	Mercury
Amended Scope Options	
Option AS-5	
Sauk River	Mercury

Groundwater Resources

The state of Minnesota is divided into six groundwater provinces with varying characteristics. The majority of the Applicant Preferred Route and Route A will cross the Central Province, which is characterized by sand aquifers in generally thick sandy and clayey glacial drift overlying Precambrian and Cretaceous bedrock. Groundwater within fractured and weathered Precambrian bedrock is used locally as a water source (MnDNR 2001).

A query of the county well index, a computerized database containing basic well information for over 340,000 water wells drilled in Minnesota, was preformed to identify water wells that may occur within the proposed routes and route option. Table 7.8-3 summarizes the water wells located within the proposed routes. Portions the Applicant Preferred Route, Route A, Route C, Route D, Route E, Route F, Route G, Route H, and Option 9 cross multiple wellhead protection areas (WHPA). WHPA are areas established to protect public water supply wells from potential contamination sources. WHPA are administered by the Minnesota Department of Health under the state wellhead protection rule (Minn. Rule 4720.5100-4720.5590).

The Applicant Preferred Route crosses the following WHPAs: the Melrose WHPA near Melrose, the New Munich WHPA near Freeport, the Sartell North WHPA near St. Stephen, and the Waite Park WHPA near St. Cloud.

Route A crosses the two following WHPAs: the Sartell North WHPA near St. Stephen, Minnesota, and the Waite Park WHPA near St. Cloud.

Routes C and D both cross the two following WHPAs: the Melrose WHPA near Melrose, and the New Munich WHPA near Freeport.

Routes E, G, and H cross the following WHPAs:the Melrose WHPA near Melrose, the New Munich WHPA near Freeport, and the Gold'n Plump Poultry WHPA, the Cold Spring North East WHPA, and the Cold Spring Alano WHPA, all three of which are near Cold Spring.

Route F crosses the following WHPAs: the Gold'n Plump Poultry WHPA near Cold Spring, the Richmond WHPA near Richmond, the Rockville WHPA within Rockville, the Melrose WHPA near Melrose, and the New Munich WHPA near Freeport.

Table 7.8-3. Water Wells contained within the Proposed Routes and Route Options

Route/Option	Water Wells
Route Alternatives	
Applicant Preferred Route	140
Route A	127
Route B	76
Route C	44
Route D	80
Route E	70
Route F	129
Route G	71
Route H	61
Route Options	
Option 8	1
Option 9	3
Option 10	1
Option 11	4
Option 12B	5
Option 12E	3
Amended Scope Options	
Option AS-4	2
Option AS-5	1

Wetlands

Wetlands are present at several points along the proposed routes. Wetlands perform many important hydrologic functions, such as maintaining stream flows, slowing and storing floodwaters, stabilizing stream banks, nutrient removal and uptake, and groundwater recharge. In the State of Minnesota, wetlands are regulated under the Wetland Conservation Act (WCA) and therefore require coordination with the Minnesota Board of Water and Soil Resources (BWSR) and Section 404 of the CWA by the USACE. PWI wetlands are also regulated by the MnDNR.

The USFWS National Wetlands Inventory (NWI) was used to identify wetlands throughout the proposed routes. Starting in the 1970s, the USFWS produced maps of wetlands (NWIs) based on above ground photographs and Natural Resources Conservation Service (NRCS) soil survey maps. Because land use has changed since the 1970s, wetlands shown on the NWI maps are sometimes inconsistent with current wetland conditions; however, NWIs are the most accurate and readily available database of wetland resources within the proposed Project area.

For jurisdictional purposes, the USACE and the State of Minnesota jointly define wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of

vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Table 7.8-4 summarizes the total acreage of NWI wetlands and NWI wetlands by type that occur within the proposed routes and route options.

Table 7.8-4. Wetland Type and Acreage within the Proposed Routes and Route Options

Route/Option	NWI Wetland Type					
	Total NWI Wetland Acreage	Freshwater Emergent	Freshwater Forested/Shrub	Freshwater Pond	Lake	Riverine
Route Alternatives						
Applicant Preferred	*2267*	1561	592	85	6	24
Route A	*2031*	1321	635	51	5	19
Route B	*699*	503	162	25	5	4
Route C	*873*	716	88	49	13	8
Route D	*799*	661	65	29	16	8
Route E	*1229*	1015	128	55	22	8
Route F	*961*	766	125	31	14	25
Route G	*967*	808	112	39	0	8
Route H	*921*	751	118	36	7	8
Route Options						
Option 8	*83*	83	0	0	0	0
Option 9	*103*	88	12	3	0	0
Option 10	*24*	14	8	2	0	0
Option 11	*17*	14	0	3	0	0
Option 12B	*152*	134	17	1	0	0
Option 12E	*72*	67	6	0	0	0
Amended Scope Options						
Option AS-4	*128*	96	32	0	0	0
Option AS-5	*19*	8	6	0	0	5

Floodplains

Floodplains are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans and subject to geomorphic (land-shaping) and hydrologic (water flow) processes. Floodplains are regulated at both the state and federal levels to promote and ensure sound land use development in floodplain areas.

Federal Emergency Management Agency (FEMA) collected data and has mapped floodplains nationwide. FEMA defines a 100-year flood zone as the following: "A 100-year flood is the flood elevation that has a one percent chance of being equaled or exceeded each year. The 100-year flood is that standard used by most Federal and state agencies and is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and determination of flood insurance" (FEMA FAQ documents).

FEMA maps were reviewed to determine the presence of floodplains within the proposed routes. This search indicated that there are 3, 100-year floodplains located within the proposed routes; The Sauk River, Watab River South Fork, and South Two River floodplains. The acreages of floodplain within the proposed routes are shown in Table 7.8-5.

Table 7.8-5. Floodplains within the Proposed Routes

Route	Floodplain	Acres
Route Alternatives		
Applicant Preferred Route	100-Year	363
Route A	100-Year	358
Route B	100-Year	97
Route C	100-Year	101
Route D	100-Year	101
Route E	100-Year	94
Route F	100-Year	245
Route G	100-Year	108
Route H	100-Year	174
Route Options		
Option 8	100-Year	0
Option 9	100-Year	56
Option 10	100-Year	0
Option 11	100-Year	0
Option 12B	100-Year	0
Option 12E	100-Year	0
Amended Scope Options		
Option AS-4	100-Year	0
Option AS-5	100-Year	46

7.8.2 Potential Impacts

This section presents the potential impacts the project could have on water. A 150-foot-wide ROW was used to calculate impacts for each proposed route. The Applicant is proposing to

parallel the Interstate 94 corridor for significant portions of the Applicant Preferred Route. As noted previously, to address the potential for conflicts with occupancy of Interstate 94 right of way, the Applicant specifically identified two alignment options for these routes, the ROW Occupancy (alignment centerline generally 25 feet outside the edge of Interstate 94 right of way) and the No ROW Occupancy (alignment centerline generally 75 feet outside the edge of Interstate 94right of way). The 150-foot-wide ROW was also used to calculate impact for each of the three Applicant Preferred Route Options in this area. Although the specific alignments have not been determined, the tables included below provide a qualitative assessment of the type of impacts that could occur when a final alignment has been selected.

Surface Water

Because all rivers, streams, and ditches would be spanned by transmission structures or avoided (if possible), a limited number of structures would be located within these features, and impacts on rivers, streams, or ditches would be minimized. Indirect impacts could include sedimentation reaching surface waters during construction due to ground disturbance by excavation, grading, construction traffic, and dewatering of holes drilled for transmission structures. This could temporarily degrade water quality due to turbidity.

Several surface flows would be crossed by the proposed routes and route options. These crossings are summarized in Tables 7.8-6 and 7.8-7.

Table 7.8-6. Potential Surface Water Impacts Route Alternatives Evaluation

Alignment	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Applicant Preferred ROW Occupancy	16	19	13
Applicant Preferred No ROW Occupancy	16	19	13
Route A	17	18	16
Route B	16	22	13
Route C	13	20	11
Route D[1]	12	20	8
Route E	14	28	9
Route F	10	26	10
Route G	12	33	12
Route H	12	43	13

[1] *Impacts calculated for Route D present impacts as though all of Route D is constructed above ground, subsequent sections of table 7.8-7 present impacts associated with the underground sections of Route D.*

Table 7.8-7. Potential Surface Water Impacts Route Options Evaluation

Alignment	Perennial Stream Crossings	Intermittent Stream Crossings	PWI Stream Crossings
Option 8 Area			
Applicant Preferred ROW Occupancy	0	2	0
Applicant Preferred No ROW Occupancy	0	2	0
Option 8	0	2	0
Option 9 Area			
Applicant Preferred ROW Occupancy	1	2	1
Applicant Preferred No ROW Occupancy	1	2	1
Option 9	3	3	1
Option 10 Area			
Route A	0	1	0
Option 10	0	1	0
Option 11 Area			
Route E	3	1	2
Option 11	0	0	0
Option 12 Area			
Route E	0	1	0
Route B	1	1	0
Amended Scope Options			
Option AS-5			
Route D/E*	1	1	1
Option AS-5	1	0	1
Underground Options			
Route D Undergrounding Freeport	0	0	0
Route D Undergrounding Albany	1	1	0
Route D Undergrounding Avon	2	5	5

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Surface waters are protected under section 401 of the CWA, which grants states authority to regulate discharges to surface waters. In Minnesota the MPCA is the authority over discharges to surface waters. All of the proposed routes and options would require a National Pollution Discharge Elimination System Permit (NPDES) permit from the MPCA for the discharge of stormwater generated from construction activities.

The USACE maintains jurisdiction over waters of the U.S. The definition of "waters of the United States" is found in 40 Code of Federal Regulations 230.3(s). It is anticipated that this project would be covered under the USACE 2007 Nation Wide Permit (NWP) 12 – Utility Line

Activities. Conditions of NWP 12 would require preconstruction notification to the District Engineer 30 days prior to commencement of construction Activities.

Groundwater Resources

All well locations within the proposed routes and route alternatives would be avoided, therefore no impacts to groundwater resources are anticipated. Coordination with both MDH and the local administrators of the WHPA located within each of the proposed routes would be required in order to comply with the regulations of each WHPA and avoid any impacts to groundwater resources.

Wetlands

Temporary and permanent wetland impacts that would occur due to construction and operation of the Project were determined using the NWI and PWI to estimate the acres of wetland located within 150-foot-wide ROW.

Temporary impacts to wetlands may occur if they need to be crossed during construction of the transmission line. Permanent impacts on wetlands would take place where structures must be located within wetland boundaries. Wetland impacts due to permanent structure placement would result in approximately 55 square feet of permanent impacts per standard single-pole structure. Temporary impacts would total approximately 20-foot-wide by length of the transmission line span of the wetland, which is the assumed width of a temporary access road. Table 7.8-8 below identifies the potential wetland impacts in the area of the proposed routes and options. Appendix H illustrates the wetland locations within the proposed routes and options.

Certain sections of route D could be located underground. These areas are shown in Appendix H. Permanent impacts in these areas were calculated using a designed ROW width of 30 feet. Permanent impacts occur when underground section cross wetland areas. Wetland impacts due to construction of the underground sections would result in permanent fill being placed within the wetland after excavation of the trench to install the underground transmission lines.

Table 7.8-8. Potential Wetland Impacts Evaluation

Alignment	Wetlands[1] NWI							Wetlands PWI[4]		
	Total Wetlands Within the ROW (Acres)	Number of Wetlands the ROW Crosses[1]	Forested Wetlands in ROW (Acres)	Number of Forested Wetlands ROW Crosses	Number of Poles in Wetlands[2]	Permanent Wetland Impacts (Acres)[2]	Temporary Wetland Impacts (Acres)[3]	Number of PWI Lakes and Wetlands within ROW	Number of Poles in PWI Wetlands by Alignment	Permanent Wetland Impacts (Acres)[2]
Route Alternatives										
Applicant Preferred ROW Occupancy	135	141	33	26	30	.03	17	4	0	0
Applicant Preferred No ROW Occupancy	142	141	36	26	30	.03	18	4	0	0
Route A	111	121	37	26	23	.023	13	1	0	0
Route B	78	87	17	15	16	.016	10	3	4	.004
Route C	104	118	14	13	24	.024	13	6	4	.004
Route D[5]	94	87	12	14	21	.021	13	4	4	.004
Route E	104	128	9	16	20	.02	13	5	0	0
Route F	106	105	18	13	27	.027	15	4	4	.004
Route G	91	102	9	16	18	.018	12	2	0	0
Route H	86	90	7	17	18	.018	11	1	0	0
Route Options										
Option 8 Area										
Applicant Preferred ROW Occupancy	4	2	0	0	2	.002	0.5	0	0	0
Applicant Preferred No ROW Occupancy	4	2	0	0	2	.002	0.5	0	0	0
Option 8	11	2	0	0	4	.004	1	0	0	0
Option 9 Area										
Applicant Preferred ROW Occupancy	3	11	2	3	0	0	0.6	0	0	0
Applicant Preferred No ROW Occupancy	3	11	4	3	0	0	1	0	0	0
Option 9	13	16	0.6	1	2	.002	2	0	0	0
Option 10 Area										
Route A	1	2	0	0	0	0	0.2	0	0	0
Option 10	3	5	0.5	2	0	0	0.4	0	0	0
Option 11 Area										
Route E	3	10	0.3	2	0	0	0.2	0	0	0
Option 11	1	8	0	0	0	0	0.1	0	0	0
Option 12 Area										
Option 12 Route E	5	2	0	0	0	0	0.6	0	0	0
Option 12 Route B	17	4	4	1	6	.006	2	2	4	.004

Alignment	Wetlands[1] NWI							Wetlands PWI[4]		
	Total Wetlands Within the ROW (Acres)	Number of Wetlands the ROW Crosses[1]	Forested Wetlands in ROW (Acres)	Number of Forested Wetlands ROW Crosses	Number of Poles in Wetlands[2]	Permanent Wetland Impacts (Acres)[2]	Temporary Wetland Impacts (Acres)[3]	Number of PWI Lakes and Wetlands within ROW	Number of Poles in PWI Wetlands by Alignment	Permanent Wetland Impacts (Acres)[2]
Amended Scope Options										
Option AS-5										
Route D/E*	7	6	0.2	1	0	0	0.8	0	0	0
Option AS-5	2	3	1	2	0	0	0.2	0	0	0
Underground Options										
Route D Undergrounding Freeport	0.3	2	0	0	NA	0.3	0.2	0	NA	0
Route D Above Ground Freeport	1	3	0	0	0	0	0.2	0	0	0
Route D Undergrounding Albany	0.9	1	0	0	NA	0.9	0.6	0	NA	0
Route D Above Ground Albany	5	2	0	0	1	.001	0.6	0	0	0
Route D Undergrounding Avon	1.8	13	0.2	1	NA	1.8	1.2	1	NA	0.04
Route D Above Ground Avon	10	20	0.8	3	1	.001	1.2	1	0	0

[1] *Wetland numbers were calculated using the NWI maps. These values represent an estimate of the number of wetlands likely present along the route. These values do not necessarily represent the number of wetland impacts subject to state and federal delineation of wetlands.*

[2] *The number of poles was determined by preliminary pole spotting conducted by Applicants and the identification of wetlands was determined using NWI wetland data for the Applicant Preferred Route, the number of poles was calculated by taking the length of the wetland crossing and divided it by an 800 foot span. The final number of poles in wetlands is dependant on final design and engineering and field delineation of wetlands. Permanent Impacts were calculated using .001 acre per pole (55 square feet per pole).*

[3] *Temporary impacts were calculated by identifying the acreage of wetlands that are within 10 feet of each side of the alignment (20 feet total width). The 20 feet in width is the assumed width of a temporary access road. This estimate is worst-case based as the entire length of the wetland would not likely need to be traversed during construction*

[4] *PWI waters were identified using the MnDNR PWI dataset.*

[5] *Impacts calculated for Route D present impacts as though all of Route D is constructed above ground, subsequent sections of table 7.8-8 present impacts associated with the underground sections of Route D.*

Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.

As discussed previously, the USACE holds jurisdiction over waters of the U.S. Impacts to wetland areas are regulated and impacts from all routes other than Route D would comply with the conditions of NWP 12. Additionally, a license to cross PWI wetlands is required from the MnDNR. Other permits potentially needed include a Section 401 CWA, Water Quality Certification. This Project may not require a permit under WCA by definition (Minn. R. 8420.0110 Subpart 18) or by exemption (R. 8420.0122 Subpart 6). Coordination with affected Local Government Units or the BWSR is required for the WCA determination.

Trenching activities located within wetland areas that would be required for construction associated with the underground sections of Route D would significantly impact wetland resources. These impacts would not be allowed under NWP 12 and would require an Individual Permit from the USACE.

Floodplains

The 150-foot-wide ROW was used in calculating impacts to FEMA 100-year floodplains for the proposed routes and options. Along with the total number of poles that would be placed in the 100-year floodplain were calculated by dividing the length of the transmission line span of the floodplain by the maximum distance between poles of 800 feet. Table 7.8-9 and Table 7.8-10 identify the potential impacts to floodplains within the proposed routes and options.

Table 7.8-9. Potential Floodplain Impacts Route Alternatives Evaluation

Alternative	Total Acreage of 100-year Floodplain	Number of Poles
Applicant Preferred ROW Occupancy	25	9
Applicant Preferred No ROW Occupancy	25	9
Route A	26	9
Route B	16	6
Route C	15	5
Route D	15	5
Route E	14	3
Route F	25	8
Route G	14	3
Route H	20	3

Table 7.8-10. Potential Floodplain Impacts Route Option Alternatives and Amended Scope Options Evaluation

Option	Total Acreage of 100-year Floodplain	Number of Poles
Option 8 Area		
Route A	0	0
Option 1	0	0
Option 9 Area		
Applicant Preferred ROW Occupancy	1	0
Applicant Preferred No ROW Occupancy	1	0
Option 5	7	0
Option 10 Area		
Route A	0	0
Option 10	0	0
Option 11 Area		
Route E	0	0
Option 11	0	0
Option 12 Area		
Option 12 Route E	0	0
Option 12 Route B	0	0
Amended Scope Options		
Option AS-5		
Route D/E*	6	2
Option AS-5	11	2

** Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.*

Impacts within FEMA floodplains would be limited to the poles placed within the floodplain, and are expected to be minimal.

7.8.3 Mitigation

The following section discusses surface water, wetland and floodplain mitigation.

Surface Waters

Impacts could be avoided and minimized using appropriate sediment control practices and construction practices. These practices may be detailed in the NPDES permit and Stormwater Pollution Prevention Plan (SWPPP) that would be completed prior to the start of construction. In addition, Minn. Stat. 84.415 requires the Applicant to obtain a license from the MnDNR for passage of any utility over, under, or across public waters.

The mitigation options for the each of the proposed routes are the same. The applicant could minimize the impacts to waterways in several ways. The Applicant has indicated that they do not intend to cross waterways with construction equipment unless necessary. Where waterways must

be crossed to string new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices could help to prevent soil erosion. There are no anticipated significant, permanent impacts on surface water quality because impacts could be minimized and mitigated, disturbed soil could be restored to previous conditions or better, and the amount of land area converted to an impervious surface is expected to be small.

Wetlands

Mitigation for all of the proposed route alternatives would be the same except for the undergrounding areas within Route D. Due to the significance of impacts to wetland resources associated with undergrounding construction, compensatory mitigation of permanently impacted resources may be required by USACE as set forth by project specific Individual Permit conditions. Further coordination with the USACE would be required to define mitigation requirements for the underground sections of Route D.

Impacts to wetlands could be minimized through construction practices. Construction crews could maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil, and stabilizing restored soil. Crews could avoid major disturbance of individual wetlands and drainage systems during construction. This could be accomplished by strategically locating new access roads and spanning wetlands and drainage systems where possible. When it is not feasible to span the wetland, construction crews could rely on several options during construction to minimize impacts:

- When possible, construction could be scheduled during frozen ground conditions;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route);
- The structures could be assembled on upland areas before they are brought to the site for installation;
- When construction during winter is not possible, construction mats could be used where wetlands could be impacted; and
- Erosion control devices (e.g., silt fence, straw bales) could be installed to ensure that sediment does not enter the water feature.

Wetland vegetation could be restored following construction.

Floodplains

Impacts within FEMA floodplains are expected to be minimal and therefore no mitigation is being proposed.

7.9 NATURAL LAND RESOURCES

This section discusses the natural environment with respect to land based natural resources in the Project area between Sauk Centre and St. Cloud and the potential impacts on these resources.

7.9.1 Affected Environment

Natural resources evaluated in this section include Sate Wildlife Management Areas (WMAs), Scientific Natural Areas (SNAs), National Wildlife Refuges (NWRs), Waterfowl Production Areas (WPAs), Conservation Easements, Flora, Fauna, Rare and Unique Natural Resources and Critical Habitat.

State WMAs make up an important part of Minnesota's outdoor recreation system, protecting those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing, hiking, wildlife viewing, and other compatible recreational uses. SNAs are state managed resources. SNAs focus on the preservation of ecological diversity and provide educational and scientific research opportunities. WMAs and SNAs are located in the area between Sauk Centre and St. Cloud.

Federally owned or managed lands that protect wildlife habitat and nesting include National Wildlife Refugees (NWRs), WPAs, and USFWS conservation easements. These lands are owned and managed by the USFWS to conserve important natural resources. WPAs are federal conservation lands that provide for wildlife viewing, hiking, and other recreational uses while also conserving waterfowl and their associated habitats. Multiple WPAs and USFWS easements located throughout the area between Sauk Centre and St. Cloud but there are no NWRs present.

Flora consists of the plants in the project region that make up vegetation communities and native vegetation. The Flora discussion will also present noxious weeds as regulated under Minn. Stat. Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality.

Fauna is defined as the wildlife throughout the Project area and consists of birds, mammals, fish, reptiles, amphibians, mussels, and insects, both resident and migratory, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, trout streams, and riverine habitats.

Critical Habitat is the natural environment that supports species. Designated habitat or conservation areas including managed areas such as MnDNR WMAs, USFWS WPAs and easements, and unmanaged areas including MnDNR designated MCBS biodiversity significance and rare native habitats and communities were analyzed within each route. All of these areas provide habitat for native vegetation, wildlife, and rare and unique resources.

The Minnesota County Biological Survey (MCBS) identifies unmanaged areas of significant biodiversity which include significant and rare native habitats and communities. The MCBS sites of biodiversity significance are ranked and organized into three classifications; moderate, high, and outstanding. Areas with moderate biodiversity significance contain significant occurrences of rare species and/or moderately disturbed native plant communities and landscapes that have a

strong potential for recovery. Areas with high biodiversity significance contain sites with high quality occurrences of the rarest plant communities and/or important functional landscapes. Areas with outstanding biodiversity significance contain the best occurrence of the rarest species; the most outstanding example of the rarest native plant communities and/or the largest, most intact functional landscapes present in Minnesota. MCBS sites are present in the area between Sauk Centre and St. Cloud but most are concentrated in the eastern area of Stearns County.

Rare and Unique Natural Resources include threatened and endangered species protected under Minn. Stat. 84.895, and under Section 7 of the federal Endangered Species Act and areas of biodiversity significance that could be associated with rare and unique species and habitats. These resources were identified using the MnDNR Natural Heritage Information System (NHIS). Threatened and endangered species are often found within high quality rare and unique habitats and features (e.g., SNAs), which could also be identified using NHIS.

Flora

The proposed project routes occur within two ecological classification system (ECS) provinces, as described by the MnDNR and United States Forest Service: the Prairie Parkland Provinces on the west end of Stearns County and the Eastern Broadleaf Forest on the east end of Stearns County (MnDNR, 1999a). Three subsections of the ECS are present between Sauk Centre and St. Cloud: Minnesota River Prairie, Hardwood Hills, and the Anoka Sand Plain (MnDNR, 1999b).

The majority of all of the proposed routes are within the Hardwood Hills subsection. The area known as the Alexandria Moraine Complex forms the western and southern boundary of the Hardwood Hills subsection. The eastern boundary of the Hardwood Hills was delineated based on general landform boundaries and the separation of lands dominated in the past by northern hardwoods from lands dominated by conifer or aspen-birch forest (MnDNR, 2010). Agriculture is the predominant present-day land use; pre-settlement vegetation included maple-basswood forests interspersed with oak savannas, tallgrass prairies, and oak forests. According to the MnDNR, wetlands and lakes in poorly-drained potholes provide opportunities for recreation or wildlife habitat. Some upland forests remain, adjacent to lakes or on steep landscapes (MnDNR, 2010). Lakes within the area attract tourism.

All of the routes except Route A and Route B travel through the Minnesota River Prairie at their western end near Melrose. Route H travels south for approximately ten miles in the Minnesota River Prairie before turning east towards St. Cloud. The Minnesota River Prairie includes loamy ground moraine and some end moraines with a gently rolling topography (MnDNR, 2010). Presettlement vegetation was primarily tallgrass prairie and present-day land use is primarily agriculture.

At their eastern-most ends, the Applicant Preferred Route and Route A enter the Anoka Sand Plain subsection. Presettlement vegetation within the Minnesota River Prairie ecological classification system subclass included primarily tallgrass prairie with many prairie potholes and depressional areas consisting of wet prairie. The Minnesota River Prairie subsection would have consisted of primarily tallgrass prairie, made up of many of the same species described

previously for the Red River Prairie subsection. The Minnesota River Prairie consists of rolling topography resulting from glacial moraines.

Presettlement vegetation within the Hardwood Hills ECS consisted of primarily mesic oak-basswood and mesic maple-basswood forests consisting of northern red oak (*Quercus rubra*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*), with small lakes and wetlands scattered throughout the woodlands. In addition, a mosaic of savannah and open grasslands were also present throughout the western fringe of the Hardwood Hills ecological classification system subsection, along the prairie-forest border (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b). Woodlands and forests dominated sites sheltered from fire by the many lakes, rivers, and wetlands that occur throughout this area.

Presettlement vegetation within the Anoka Sand Plain ecological classification system subsection consisted of a mosaic dry prairies, with little bluestem (*Schizachyrium scoparium*) and porcupine grass (*Stipa spartea*) as dominant grasses, and savannahs of bur oak (*Quercus macrocarpa*), and northern pin oak (*Quercus ellipsoidales*) interspersed with scattered wetlands across a generally flat to subtly rolling landscape (MnDNR, 2010; MnDNR, 2005a; MnDNR, 2005b).

Noxious Weeds and Invasive Plant Species Affected Environment

Noxious weeds are regulated under Minn. Stat. Chapter 18. Noxious weeds can overtake native vegetation and degrade habitat quality. Cropland may suffer losses in productivity following noxious weed infestations. Noxious weeds can be introduced to new areas through transporting propagating material like roots or seeds on contaminated construction equipment. Disturbed soil surfaces allow noxious weeds to become established. Eleven species of prohibited noxious weeds are recognized and prohibited by Minnesota Administrative Rules 1505.0730. See Table 7.9-1 below. The Minnesota Noxious Weed Law also identifies 52 secondary noxious weeds. A county may select a weed or weeds from this secondary list to be placed on its noxious weeds list. If a secondary noxious weed is placed on a county noxious weed list, that weed must be controlled in that county. Applicants have indicated that they will continue to work with the state and counties crossed to identify locations along the proposed routes where invasive species may occur, and identify measures that must be taken to control these species. The potential for noxious weed impacts as associated with the proposed routes and options would be similar.

Table 7.9-1. Minnesota Prohibited Noxious Weeds

Common Name	Scientific Name
Garlic mustard	*Alliaria petiolata*
Hemp	*Cannabis sativa*
Plumeless thistle	*Carduus acanthoides*
Musk thistle	*Carduus nutans*
Canada thistle	*Cirsium arvense*
Bull thistle	*Cirsium vulgare*
Field bindweed	*Convolvulus arvensis*
Leafy spurge	*Euphorbia esula*
Purple loosestrife	*Lythrum salicaria*
Perennial sow thistle	*Sonchus arvensis*
Poison ivy	*Toxicodendron radicans*

Source: Minnesota Administrative Rules. 1505.0730 PROHIBITED NOXIOUS WEEDS. Subpart 1.State prohibited noxious weed list . Available online at: https://www.revisor.mn.gov/rules/?id=1505.0730

Fauna

Common wildlife species found within the regional area include large and small mammals, songbirds, waterfowl, raptors, fish, reptiles, amphibians, mussels, and insects. Wildlife throughout the Project area consists of both resident and migratory species, which use the area habitat for forage, shelter, breeding, or as a stopover during migration. Species include those found in agricultural landscapes, prairie remnants, pasture, grasslands, wetland, and riverine habitats. Common mammals for these habitats include raccoon (*Procyon lotor*), skunk (*Mephitis spp.*), whitetailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), badger (*Taxidea taxus*), porcupine (*Erethizon dorsatum*), and rabbit (*Sylvilagus* spp.). Common birds include songbirds, hawks such as red-tailed hawk (*Buteo jamaicensis*) and Cooper's hawk (*Accipter cooperii*), waterfowl, and game birds such as pheasant (*Phasianus colchinus*) and turkey (*Meleagus gallopavo*)(MnDNR, 2008). Appendix D provides lists of common mammals, birds, reptiles, and amphibians that may occur in the area.

Throughout the area between Sauk Centre and St. Cloud, areas exist where high-quality wildlife habitat occurs naturally or is being managed. Designated habitat or conservation areas including managed areas such as MnDNR WMAs; USFWS WPAs and conservation easements; and unmanaged areas including MnDNR-designated MCBS biodiversity significance and rare native habitats and communities were analyzed within the proposed routes.

While agricultural land uses are an important component of wildlife resources in the area between Sauk Centre and St. Cloud, land managed to promote wildlife habitat can provide for higher species diversity and larger populations than surrounding landscapes that are intensively used for agriculture.

The Migratory Bird Treaty Act of 1918 (16 United States Code (USC) 703-712) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. The Fish and Wildlife Conservation Act of 1980 (16 USC 2901-2911) affords protection to Birds of Conservation Concern. Migratory birds and Birds of Conservation

Concern are an important component of biodiversity in North America. Many species are known to occur in the Project area in a variety of upland and wetland habitats. Additionally, the Bald and Golden Eagle Protection Act (16 USC 668-668C), which was enacted in 1940, specifically prohibits the taking or possession of and commerce in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), either alive or dead, or any part, nest, or egg of these eagles.

7.9.2 Potential Impacts

This section presents the impacts the project could have on land resources where potential impacts may occur. Further, if impacts may occur, potential mitigation is discussed.

Flora

Flora throughout most of the area between Sauk Centre and St. Cloud is typical of that normally found in an agricultural setting. The majority of the Applicant Preferred Route occurs along existing rights-of-way, including roads, and is also often adjacent to cultivated row crops. Given that the vegetation communities that occur in these areas are regularly disturbed, impacts due to construction are not anticipated to substantially disrupt vegetative community quality or function. Route A does not follow major existing infrastructure and is generally along property lines or local roadways. Applicants have indicated that they would span areas containing native plant communities wherever possible or practicable. Applicants have also indicated that they would also work to avoid and minimize direct impacts on habitat and conservation areas to the extent feasible.

Temporary impacts to flora would take place most intensively at the structure locations. Temporary impacts are estimated at one acre per pole. Permanent vegetative changes would take place within the right-of-way. Trees and shrubs that may interfere with maintenance and the safe operation of the transmission line would not be allowed to establish within the right-of-way. Co-locating with existing corridors through wooded areas would reduce the impact on trees and habitats they support. Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the right-of-way after construction; for the underground portions of Route D, vegetation would generally be limited to grasses and low shrubs. In addition, permanent impacts would be required at each pole location. The permanent impacts are estimated at 55 square feet per pole. Vegetation is comprised of wooded and non-wooded lands that are not agriculture. Non-wooded lands are designated as emergent herbaceous wetlands and urban/recreation grasses and wooded lands are designated as deciduous forest, evergreen forest, mixed forest, woody wetlands by the National Land Cover Data (NLCD). Refer to Table 7.9-2 below for estimated temporary and permanent impacts to vegetation between Sauk Centre and St. Cloud, and to Table 7.9-3 for a comparison of vegetation impacts in the proposed underground portions of Route D.

Table 7.9-2. Temporary and Permanent Impacts to Non-Agricultural Vegetation (Sauk Centre to St. Cloud)

Vegetation by Route/Option	Estimated Number of Poles in Vegetated Cover	Temporary Impacts (1 Acre Per Pole) Acres	Permanent Impacts (55 SF Per Pole) SF	Permanent Impacts (55 SF Per Pole) Acres
Route Alternatives				
Applicant Preferred ROW Occupancy	89	89	4,879	0.11
Applicant Preferred No ROW Occupancy	89	89	4,875	0.11
Route A	76	76	4,184	0.1
Route B	73	73	4,025	0.09
Route C	74	74	4,090	0.08
Route D	61	61	3,343	0.06
Route E	58	58	3,216	0.07
Route F	62	62	3,404	0.07
Route G	55	55	3,005	0.06
Route H	57	57	3,125	0.07
Route Options				
Option 8 Area				
Applicant Preferred Route	1	1	68	0
Option 8	4	4	216	0
Option 9 Area				
Applicant Preferred ROW Occupancy	3	3	173	0
Applicant Preferred No ROW Occupancy	2	2	121	0
Option 9	6	6	334	0.01
Option 10 Area				
Route A	0	0	0	0
Option 10	1	1	73	0
Option 11 Area				
Route E	5	5	262	0
Option 11	4	4	244	0.01
Option 12				
Route E	5	5	248	0
B Segments	9	9	478	0.01
Amended Scope Options				
Route D/E *	6	6	315	0
AS-4	0	0	0	0
AS-5	1	1	50	0

**AS-4 is a wider area with out an alignment or ROW. This area is agricultural, to traverse the area the approximate number of poles and impacts is provided.*
Source: NCLD, 2001
Route D/E is a combination of a 1 miles long segment of Route D that parallels Interstate 94 and a 1 mile long segment of Route E that parallels State Highway 138 in the Quarry substation area. Route D/E was developed as a comparable route to AS-5.

Table 7.9-3. Temporary and Permanent Impacts to Non-Agricultural Vegetation within Route D Above Ground and Underground Options

Route	Permanent Impacts to Underground ROW 60' (Acres)	Pole Impacts Above Ground (Acres)
Route Options		
Route D Undergrounding Freeport	1	0
Route D Undergrounding Albany	4	0
Route D Undergrounding Avon	14	0

Source: NCLD, 2001

None of the alternatives represent major permanent impacts to vegetation. The undergrounding options for Route D would impact more wooded lands because a 60 foot permanent linear easement would have greater impacts than poles. In forested areas, clearing for access roads and staging areas would be limited to only trees necessary to permit the passage of equipment. Once construction is complete, temporary access roads would be removed and the area would be restored to its original grade and seeded to stabilize the soil.

Fauna

There is potential for the displacement of wildlife and loss of habitat from construction of the Project. Wildlife 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. Additionally, these animals would be typical of those found in agricultural and urban settings and should not incur population level effects due to construction.

Habitat fragmentation could be caused by the transmission line bisecting habitats. Where the proposed transmission line follows existing features such as roads, transmission lines, or field lines, very few new corridors would be created as a result of this Project. In any case, areas of sensitive habitat would be spanned as much as possible. Impacts from habitat fragmentation can extend beyond the area disturbed by a new route. Fragmentation affects some wildlife species by creating barriers to daily migrations. Predation can increase among animals that are forced out of cover as they search for food, and decreases the distance that predators may have to travel to penetrate large habitat areas. Some species depend on large areas of undisturbed habitat and their survivability decreases as fragmentation increases.

Temporary impacts on fauna would take place most intensively at the structure locations (requiring one acre per structure). Staging areas and stringing areas would also temporarily impact fauna within the Project area. Grading could occur at the staging areas if they are not located in previously disturbed sites. Through right-of-way access would be limited to 20 feet in width. In forested areas, clearing would be limited to only those trees necessary to permit the passage of equipment and the area would be restored to original condition.

Raptors, waterfowl, and other bird species may be affected by the construction and placement of the transmission line. Avian collisions are a possibility after the completion of the transmission line but the larger size of conductors associated with transmission lines compared to distribution lines would result in higher visibility, potentially decreasing collisions. Waterfowl typically are more susceptible to transmission line collision, especially if the transmission line is placed between agricultural fields that serve as feeding areas, and wetlands or open water, which serve as resting areas. In these areas, it is likely that waterfowl and other birds would be traveling between different habitats, potentially increasing the likelihood of avian conflicts with the transmission line. Because of the high density of birds in such nesting sites, disturbance to the site has the potential to impact individuals. Species' population reproductive success is not likely to be impacted.

Electrocution occurs when birds with large wingspans come in contact with either two conductors or a conductor and a grounding device. Applicants' transmission line design standards provide adequate spacing to eliminate the risk of raptor electrocution. As such, electrocution is not a concern related to this Project.

Because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries would be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

Rare Unique Natural Resources/Critical Habitat

Rare and unique communities and habitats occur throughout the area between Sauk Centre and St. Cloud. Rare and unique communities include federal waterfowl production areas and state WMAs, SNAs, parks, trails, and MCBS sites of biodiversity significance. Data from the USFWS, MnDNR, and private organizations were reviewed to determine areas containing rare or unique communities and habitats within the proposed routes. Federal lands along the routes include WPAs, which are included within the NWR system and are managed by the USFWS, preserve wetlands and grasslands critical to waterfowl and other wildlife; and wetland, grassland, and Farmers Home Administration easements, which are managed by the USFWS to protect the prairie pothole community and wetlands on farmlands, respectively. State-owned lands along the routes include WMAs and easements managed by the Board of Water and Soil Resources (BWSR). In addition, the MnDNR, Division of Ecological Resources, MCBS data were reviewed to determine if there were areas with moderate, high, or outstanding biodiversity significance within the routes.

The following sections discuss the potentially sensitive habitat areas that are present within the routes and options between Sauk Centre and St. Cloud. Refer to the table below for impact calculations by route and ROW.

Applicant Preferred Route

One USFWS easement, eight Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and six Native Plant Communities are crossed by the Applicant Preferred Route. No WMAs, WPAs, SNAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by the Applicant Preferred Route between Sauk Centre and St. Cloud.

According to MnDNR, the St. Wendel Tamarack Bog SNA is one of the top two sites for Significant Biological Diversity in Stearns County and is a large wetland complex, which encompasses one of the largest remaining blocks of native vegetation in the county. This SNA supports the best and largest example of Minerotrophic Tamarack Swamp in central Minnesota. The SNA is approximately one mile west of the Applicant Preferred Route and is not impacted by the alignment.

Route A

Six Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance and seven Native Plant Communities are crossed by Route A. No WMAs, WPAs, SNAs, USFWS Easements, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route A between Sauk Centre and St. Cloud. Similar to the Preferred Route the St. Wendel Tamarack Bog SNA is approximately one mile west of the Applicant Preferred Route and is not impacted by the alignment.

Route B

One USFWS easement, one SNA, ten Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and nine Native Plant Communities are crossed by Route B. No WMAs, WPAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route B.

Route C

One USFWS easement, nine Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and three Native Plant Communities are crossed by Route C. No WMAs, WPAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route C.

Route D

One USFWS easement, ten Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and three Native Plant Communities are crossed by Route D. No WMAs, WPAs, SNAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route B.

Route D Undergrounding Options

The undergrounding options for Route D do not impact any additional resources except for the undergrounding option between Avon and St. Joseph which impacts one Native Plant Communities and one MCBS site of moderate significance. Impacts from undergrounding options in comparison to above ground options are presented in the discussion following the table below.

Route E

One USFWS easement, one WMA, eleven Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and five Native Plant Communities are crossed by Route E. No WPAs, SNAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route E.

Route F

One USFWS easement, two SNAs, fifteen Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and eight Native Plant Communities are crossed by Route F. No WMAs, WPAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route F.

Route G

One USFWS easement, eleven Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and six Native Plant Communities are crossed by Route G. No WMAs WPAs, SNAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route G.

Route H

One USFWS easement, one WMA, eleven Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance, and six Native Plant Communities are crossed by Route H. No WPAs, SNAs, MCBS Railroad Prairies, or BWSR RIM Easements are crossed by Route H.

Option 8

Option 8 does not impact any sensitive resources described in this section.

Option 9

Option 9 impacts one USFWS easement that is not impacted by the Applicant Preferred ROW Occupancy and No ROW Occupancy alignments in this location.

Option 10

Option 10 does not impact any sensitive resources described in this section.

Option 11

Option 11 does not impact any sensitive resources described in this section, whereas the alternate Route E impacts two Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance and four Native Plant Communities in the same location.

Option 12

Option 12 impacts two Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance when traveling on the B Segments and one Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance when traveling on the alternate Route E.

Amended Scope Option 4

AS4 does not impact any sensitive resources described in this section.

Amended Scope Option 5

AS5 does not impact any sensitive resources described in this section.

Table 7.9-4 below identifies acreage of potential impacts to sensitive management areas and conservation easements within proposed routes and ROW for each route and route option. There are no additional resources located in AS4 or AS5 and therefore they are not included in the table.

Table 7.9-4. Route Impact Evaluation

Habitat Classification	Applicant Preferred Route ROW Occupancy		Applicant Preferred Route No ROW Occupancy		Route A		Route B		Route C	
	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)	Route (Acres)	ROW (Acres)
WPAs	0	0	0	0	0	0	0	0	0	0
WMAs	0	0	0	0	0	0	0	0	0	0
USFWS Easements										
Wetlands	0	0	0	0	0	0	0	0	0	0
Grasslands	0	0	0	0	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	0	0	0	0	0	0
Other	80.7	0	80.7	0	0	0	29.4	6.5	80.7	0
MCBS, Sites of Biodiversity Significance										
Moderate	0	0	0	0	0.3	0	33	1	0	0
High	356	20	356	20	356	20	0	0	0	0
Outstanding	0	0	0	0	0	0	57	3	57	0
MCBS, Native Plant Communities	92	7	92	7	92	7	46	2	29	0
MCBS, Railroad Right-of-Way Prairies										
Fair	0	0	0	0	0	0	0	0	0	0
Good	0	0	0	0	0	0	0	0	0	0
Very Good	0	0	0	0	0	0	0	0	0	0
SNAs	0	0	0	0	0	0	6	0.02	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	1	0	30	6.5	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0	0	0	0	0
Calcareous Ferns										
Outstanding	0	0	0	0	0	0	0	0	0	0

Table 7.9-5. Route Impact Evaluation (Sauk Centre to St. Cloud) Continued

Habitat Classification	Route D		Route E		Route F		Route G		Route H	
	Route	ROW	Route	ROW	Route	ROW	Route	ROW	Route	ROW
WPAs	0	0	0	0	0	0	0	0	0	0
WMAs	0	0	17	0.04	0	0	0	0	28	1
USFWS Easements										
Wetlands	0	0	0	0	0	0	0	0	0	0
Grasslands	0	0	0	0	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	0	0	0	0	0	0
Other	80.7	0	80.7	0	80.7	0	80.7	0	80.7	0
MCBS, Sites of Biodiversity Significance										
Moderate	15	3	42	6	55	10	60	6	60	6
High	1	0	20	2	42	3	51	8	51	8
Outstanding	0	0	0	0	0	0	0	0	0	0
MCBS, Native Plant Communities	15	3	37	3	9	1	56	7	56	7
MCBS, Railroad Right-of-Way Prairies										
Fair	0	0	0	0	0	0	0	0	0	0
Good	0	0	0	0	0	0	0	0	0	0
Very Good	0	0	0	0	0	0	0	0	0	0
SNAs	0	0	0	0	13	0.4	0	0	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	0	0	0	0	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0	0	0	0	0
Calcareous Ferns										
Outstanding	0	0	0	0	0	0	0	0	0	0

Table 7.9-6. Route Option Impact Evaluation

Habitat Classification	Option 8 Area				Option 9 Area				Option 10 Area			
	Applicant Preferred Route		Option 8		Applicant Preferred Route		Option 9		Route A		Option 10	
	Route	ROW	Route	ROW	Route	ROW	Route	ROW	Route	ROW	Route	ROW
WPAs	0	0	0	0	0	0	0	0	0	0	0	0
WMAs	0	0	0	0	0	0	0	0	0	0	0	0
USFWS Easements												
Wetlands	0	0	0	0	0	0	0	0	0	0	0	0
Grasslands	0	0	0	0	0	0	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	37.2	6.6	0	0	0.2	0
MCBS, Sites of Biodiversity Significance												
Moderate	0	0	0	0	0	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0	0	0	0	0	0
Outstanding	0	0	0	0	0	0	0	0	0	0	0	0
MCBS, Native Plant Communities	0	0	0	0	0	0	0	0	0	0	0	0
MCBS, Railroad Right-of-Way Prairies												
Fair	-	0	-	0	-	0	-	0	-	0	-	0
Good	-	0	-	0	-	0	-	0	-	0	-	0
Very Good	-	0	-	0	-	0	-	0	-	0	-	0
SNAs	0	0	0	0	0	0	0	0	0	0	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	0	0	0	0	0	0	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0	0	0	0	0	0	0
Calcareous Ferns												
Outstanding	0	0	0	0	0	0	0	0	0	0	0	0

Table 7.9-7. Route Option Impact Evaluation (Continued)

Habitat Classification	Option 11 Area				Option 12 Area			
	Route E		Option 11		Route E		Route B4 & B5	
	Route	ROW	Route	ROW	Route	ROW	Route	ROW
WPAs	-	0	-	0	-	0	-	0
WMAs	-	0	-	0	-	0	-	0
USFWS Easements								
Wetlands	0	0	0	0	0	0	0	0
Grasslands	0	0	0	0	0	0	0	0
Farmers Home Administration	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
MCBS, Sites of Biodiversity Significance								
Moderate	8	0.3	0	0	0	0	0	0
High	20	2	0	0	0	0	0	0
Outstanding	0	0	0	0	0	0	0	0
MCBS, Native Plant Communities	0	0	0	0	0	0	0	0
MCBS, Railroad Right-of-Way Prairies								
Fair	-	0	-	0	-	0	-	0
Good	-	0	-	0	-	0	-	0
Very Good	-	0	-	0	-	0	-	0
SNAs	0	0	0	0	0	0	0	0
Minnesota Land Trust Conservation Easements	0	0	0	0	0	0	0	0
BWSR, Re-Invest in Minnesota (RIM) Easements	0	0	0	0	0	0	0	0
Calcareous Ferns								
Outstanding	0	0	0	0	0	0	0	0

The Applicant Preferred ROW Occupancy and No ROW Occupancy alignments include 20 acres of an MCBS site designated high and seven acres of an MCBS native plant community within their ROWs but they do not impact any additional sensitive management areas or conservation easements. The Route A impacts are identical to the Applicant Preferred Routes within its ROW.

Route B impacts includes more sensitive resources and easements within its ROW than the Applicant Preferred Routes and Route A. Route C does not include any impacts to management areas or conservation easements within its ROW. Similar to the Applicant Preferred Routes and Route A, Route D impacts MCBS biodiversity sites and native plant communities but includes less acreage within its ROW.

The undergrounding options for Route D are not represented in the table because they do not impact any additional resources except for one impact to an MCBS Site and one impact to a

Native Plant Community between Avon and St. Joseph. This undergrounding option would impact approximately 2.6 acres of an MCBS site designated as moderate whereas the above ground option at this location would impact 3.1 acres of the same site plus approximately 0.02 acres of another site designated as high for biodiversity. The undergrounding option would also impact approximately 1.15 acres of a native plant community whereas the above ground option would impact approximately three acres of the same plant community. However the above ground option would also impact approximately 0.02 acres of an additional site that is not impacted by the undergrounding option. With respect to these resources the undergrounding options have fewer impacts than the above ground option.

Route E includes a small portion of a WMA within its ROW in addition to MCBS biodiversity sites and native plant communities however its impact to the MCBS resources are less than the Applicant Preferred Route and Route A.

Route F includes a small portion of an SNA within its ROW in addition to MCBS biodiversity sites and native plant communities however its impact to the MCBS resources are less than the Applicant Preferred Route and Route A. Overall, Route F has the greatest impacts of any route on SNAs. It is important to note that impacts to SNAs are not allowed under state regulations; therefore if Route F were to be selected, a modified ROW would be required that avoids this SNA.

Similar to the Applicant Preferred Routes and Route A, Route G impacts MCBS biodiversity sites and native plant communities but includes less acreage within its ROW. Route H has the same impacts as Route G with an additional impact of one acre to a WMA. This represents the greatest impact to a WMA between Sauk Centre and St. Cloud.

Generally, the proposed Route Options do not impact any additional resources except in three cases. Option 9 includes USFWS easements within its proposed ROW whereas the Applicant Preferred Route does not. Option 11 impacts fewer MCBS sites within its proposed ROW than its alternate Route E.

Protected Species

This section discusses species protected under Section 7 of the Endangered Species Act and Minn. Stat. 84.895. Species protected under the Endangered Species Act include those listed as federally threatened or endangered. Species protected under state statute are those listed as special concern, threatened, and endangered. There are no state-listed threatened, endangered or candidate species identified within any of the ROWs for the proposed routes, route options, or amended scoping options. No federally listed species have been identified within one mile of the proposed routes. Refer to Table 7.9-8 below for a list of protected species occurrences, if applicable, for each Route (Routes that do not contain identified protected species are not listed in the table).

Table 7.9-8. Protected Species Occurrences for Routes and Options

Common Name	Scientific Name	Number of Occurrences within 1,000' Route	Number of Occurrences within 150' ROW	MN Status	State Rank
Applicant Preferred Route					
Plants					
Native Plant Community, Undetermined Class	*NA*	1	0	NA	SNR
Willow - Dogwood Shrub Swamp Type	*NA*	1	0		S4
Route A					
Plants					
Native Plant Community, Undetermined Class	Native Plant Community, Undetermined Class	1	0	NA	SNR
Willow - Dogwood Shrub Swamp Type	Willow - Dogwood Shrub Swamp Type	1	0	NA	S4
Route C					
Vertebrates					
Pugnose shiner	*Notropis anogenus*	1	0	SC	S3
Route F					
Vertebrates					
Blanding's turtle	*Emydoidea landingii*	1	0	THR	S2
Plants					
Dry Hill Prairie (Southern)	Dry Hill Prairie (Southern) Type	1	0	NA	S2
Invertebrates					
Black sandshell	*Ligumia recta*	1	0	SC	S3
Route G					
Birds					
Cerulean warbler	*Dendroica cerulea*	1	0	SC	S3B
Route H					
Birds					
Cerulean warbler	*Dendroica cerulea*	1	0	SC	S3B

7.9.3 Mitigation

Flora

The transmission line alignment and structure locations would be determined in final design and mitigation measures may include spanning sensitive flora or vegetation. The disturbance necessary for construction may cause a reduction of habitat within the ROW for some wildlife. The effect diminishes after construction as vegetation reestablishes. If the ROW is then managed for maximum vegetation cover, there should not be a significant long-term reduction

in habitat. Areas disturbed due to construction activities could be restored to pre-construction contours and reseeded with a seed mix recommended by local MnDNR management and that is certified to be free of noxious weeds.

The Applicants have indicated that they intend to continue to work with the MnDNR and USFWS to minimize and avoid impacts to properties where native vegetation occurs and is managed. The proposed routes could avoid and minimize impacts on properties where native vegetation occurs, wherever possible. When native vegetation communities cannot feasibly be spanned, Applicants intend to work to minimize the number of permanent structures that may impact the native community. Naturally managed properties disturbed during construction could be restored to pre-construction contours and could be reseeded with a seed mix recommended by agency staff or required according to required project permits. The applicant is proposing to restore disturbed land to pre-construction contours and stabilized using a seed mix specified within the project's NPDES permit requirements.

Similarly, the Applicant could continue to work with the MnDNR and USFWS to minimize and avoid impacts on sensitive flora along the route and intend to avoid and minimize impacts on any areas known to contain native vegetation, wherever possible.

Construction equipment can spread noxious weed-propagating material to new locations. The Applicant intends to comply with Minnesota noxious weed laws as described in Minn. R. Ch. 1505 and intend to observe county weed lists where they occur. Around substations and switches, Applicants intend to provide for weed control in a manner that does not allow for the spread of weeds onto adjacent agricultural land during operation of the transmission line.

Typically, vegetation is controlled mechanically or with herbicides on a regular maintenance schedule. Vegetation that does not interfere with the safe operation of the transmission line is allowed to reestablish within the ROW after construction.

Crews could attempt to limit ground disturbance wherever possible during the construction of the transmission line and substations. However, areas of disturbance are expected during the normal course of work, which may occur over several weeks in any one location. As construction on each parcel is completed, disturbed areas could be restored to their original condition to the maximum extent practicable. The ROW agent could contact each property owner after construction is completed to see if any damage has occurred as a result of the project. In some cases, Applicants may engage an outside contractor to restore the damaged property to as near as possible to its original condition. Resilient species of common grasses and shrubs typically reestablish areas disturbed during construction with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line route may require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Erosion control blankets with embedded seeds;
- Silt fences; and
- Straw bales.

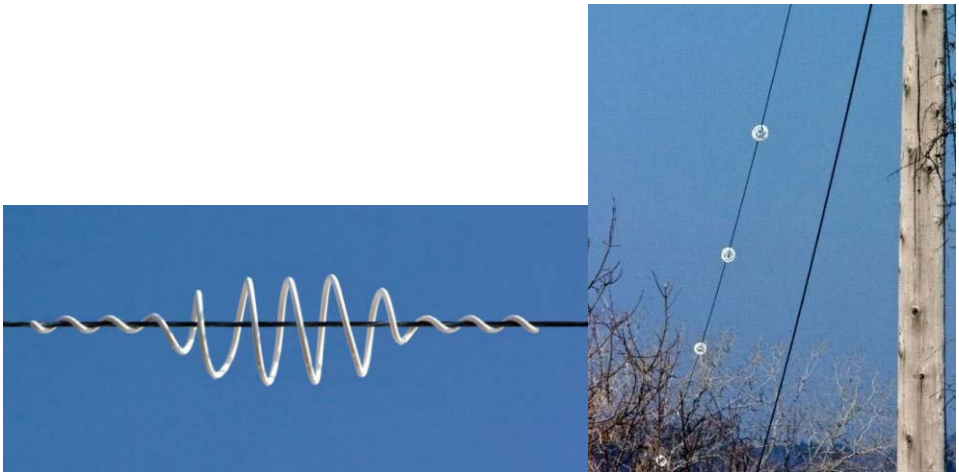
These erosion control and vegetation establishment practices are regularly used in construction projects and are referenced in the construction plans to comply with the NPDES stormwater permit. Long-term impacts are minimized by utilizing these construction techniques.

Fauna

To mitigate possible impacts on wildlife, Applicants could span designated high quality wildlife habitat areas to the extent feasible. In areas where complete spanning is not possible, Applicants could minimize the number of structures placed in high quality wildlife habitat, and couldwork with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures. Also, Applicants have routed the Applicant Preferred Route such that the majority is co-located with the Interstate 94 corridor or other existing rights-of-way that have been previously disturbed; therefore, minimizing additional tree clearing that could increase fragmentation. Similarly, because transmission line routing avoids direct impacts to lakes and rivers, impacts on fisheries would be small. Any impacts, temporary or permanent, are unlikely to affect population levels of these species.

According to the Applicant, avian issues at water body crossings and other areas of concern could be addressed by working with the USFWS and MnDNR to identify any areas that may require marking the proposed transmission line, such as with the use of bird flight diverters, in an effort to reduce the likelihood of collisions. In 2002, Xcel Energy entered into a voluntary Memorandum of Understanding with the USFWS to work together to address avian issues throughout its service territories. The development of Avian Protection Plans for each state the Company serves, including Minnesota, is currently underway to help support the Memorandum of Understanding. This Memorandum of Understanding has been approved by the USFWS. Additionally, to mitigate possible impacts on wildlife, the Applicant is proposing to avoid areas known as major flyways or migratory resting spots, and span designated high quality wildlife habitat areas to the extent feasible. In areas where complete spanning is not possible, the Applicant intends to minimize the number of structures placed in high quality wildlife habitat, and is proposing to work with the MnDNR and USFWS to determine appropriate minimization and/or mitigation measures such as adding transmission line shield wires to the lines.

Diagram 7-6. Transmission Line Shield Wires



Source: CapX2020. 2009. Birds and Power Lines. CapX2020 Fact Sheets.

The Applicant is proposing to restore disturbed areas due to construction activities to pre-construction contours and is proposing to reseed with a MnDNR-recommended seed mix that is free of noxious weeds.

Rare Unique Natural Resources/Critical Habitat

MCSB areas of moderate, high, and outstanding biodiversity significance, and MnDNR-listed natural communities are areas known to be capable of supporting rare and unique species. The number of structures placed in these areas could either be avoided or minimized by maximizing the span across them. Where structure placement cannot be avoided in these sensitive communities, special status species associated with these habitats could be affected. Applicants could also span any habitats where unique plant communities have been recorded or are likely to occur, wherever possible. If construction within these resources cannot be avoided, surveys could be conducted and the appropriate agencies could be consulted to assure impacts to listed species are avoided or minimized.

As discussed in previous sections, Applicants have routed the Applicant Preferred Route such that the majority is co-located with existing rights-of-way, therefore minimizing additional tree clearing that could increase fragmentation of sensitive habitats.

In addition, Applicants would follow standard erosion control measures identified in the Minnesota Pollution Control Agency's (MPCA) Stormwater Best Management Practices Manual to maintain sound water and soil conservation practices during construction of the Project to minimize soil erosion, and protect topsoil and adjacent water resources. These measures include using silt fencing, slope breaks, containing excavated material, protecting exposed soil, and stabilizing restored soil. These measures could be used to minimize erosion and sedimentation impacts to adjacent water resources. Construction would be completed according to NPDES permit requirements.

No construction activities would occur within or immediately adjacent to waterbodies or wetlands, to the extent feasible. Applicants could avoid major disturbance of individual wetlands

and waterbodies during construction. This could primarily be accomplished by spanning wetlands and waterbodies.

Where water resources must be crossed to string new conductors and shield wires, workers may walk across, use boats, drive equipment across ice in the winter, or use temporary bridges to cross over or through the wetland or waterbody. Wetland and waterbody boundaries along the construction corridor would be identified and marked prior to construction to assure these sensitive areas are protected accordingly. Setbacks would be established to identify safe fueling areas and staging areas a sufficient distance from waterbodies and wetlands when possible or as required by permit conditions. These construction practices would help to prevent siltation within waterbodies and wetlands and minimize the risk of an inadvertent release of harmful fluids due to fueling and lubricating of equipment.

Avoidance and minimization could be accomplished by strategically locating new access roads outside of wetland and waterbody boundaries and spanning wetlands and waterbodies, where possible. When it is not feasible to span a water resource, or avoid access to the right-of-way through a wetland or waterbody, construction crews could rely on several options during construction to minimize impacts, including:

- When possible, construction would be scheduled during frozen ground conditions;
- When construction during winter is not possible, construction mats could be used as needed to minimize temporary impacts due to construction in a water resource;
- Crews could attempt to access the wetland with the least amount of physical impact to the wetland (i.e., shortest route); and
- The structures could be assembled in upland areas before they are installed within a water resource to minimize temporary impacts due to structure installation.

Protected Species

No protected species have been identified within any of the proposed ROWs therefore no mitigation is proposed.

Where structure placement and/or spanning of transmission lines cannot be avoided in suitable habitats, listed species associated with these habitats could be affected. If project activities within potentially suitable habitat cannot be avoided, surveys could be conducted and the MnDNR could be consulted to ensure impacts on listed species are avoided or minimized.

The special status species associated with wetlands, stream banks, and rivers could be impacted by placement of structures within these habitats, or by increased erosion and sedimentation that could occur if appropriate mitigative measures or Best Management Practices are not employed. Therefore, the Applicant could span rivers, streams, and wetlands throughout the project area to the extent practical, implement the appropriate mitigation measures or practices such as using construction mats to avoid soil compaction, and maintain sound water and soil conservation practices during construction of the project to protect topsoil and adjacent water resources, minimizing soil erosion and sedimentation. However, if it is not feasible to span, surveys could be conducted to determine the presence of state-listed species or suitability of habitat for such

species, and coordination could occur with the appropriate agencies to avoid and minimize any associated impacts.

Environmentally sensitive areas and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas would be to span all streams and rivers. Construction mats are also placed in wet or soft soil locations and narrow ditches to minimize disturbances. These mats can also provide access to sensitive areas during times when the ground is not frozen to minimize impacts at the site. Diagram 5-8 shows an example of construction mats.

Diagram 7-7. Example of Construction Mats

Source: Route Permit Application for the Monticello to St. Cloud 345 kV Transmission Line Project.

7.10 AIR QUALITY

This section discusses the potential for ozone and nitrogen oxide production from transmission lines, and temporary air quality impacts associated with construction activities. In general, transmission lines and substations do not produce significant amounts of air pollutants. During construction, it is possible that fugitive dust can be created resulting from soil disturbance and released into the atmosphere. The entire project area is in attainment with National and Minnesota Ambient Air Quality Standards for all criteria pollutants.

7.10.1 Affected Environment

The affected environment is the area near the transmission line and substations, which travels through portions of Stearns County. The county is classified as an attainment area for all criteria

air pollutants (Carbon Monoxide - CO, Lead - Pb, Nitrogen Dioxide - NO_x, Particulate Matter (PM_{10} and $PM_{2.5}$), Ozone – O_3, and Sulfur Dioxide – SO_2).

Currently, ambient air monitoring data are collected for $PM_{2.5}$, O_3, and CO for one station within Stearns County. Ambient air monitoring data taken from these stations, provided in Appendix E, show that monitored data are lower than the National Ambient Air Quality Standards found in Table 7.10-1. Other criteria pollutants are not currently monitored within the affected environment.

Table 7.10-1. National Ambient Air Quality Standards

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.	
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	
	35 ppm (40 mg/m^3)	1-hour[1]	None	
Lead	0.15 μg/ m^3	Rolling 3-Month Average	Same as Primary	
	1.5 μg/ m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 μg/ m^3)	Annual (Arithmetic Mean)	Same as Primary	
	0.100 ppm (189 μg/ m^3)	1-hour[8]	None	
Particulate Matter (PM_{10})	150 μg/ m^3	24-hour[2]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 μg/ m^3	Annual[3] (Arith. Mean)	Same as Primary	
	35 μg/ m^3	24-hour[4]	Same as Primary	
Ozone	0.075 ppm (2008 standard)	8-hour[5]	Same as Primary	
	0.08 ppm (1997 standard)	8-hour[6]	Same as Primary	
	0.12 ppm	1-hour[7] (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arith. Mean)	0.5 ppm	3-hour[1]
	0.14 ppm	24-hour[1]		
	0.075 ppm	1-hour[9]	0.5 ppm (1300 μg/m^3)	

Source: www.epa.gov/air/criteria.html - Information Retrieved June 25, 2010.
Notes:
[1] Not to be exceeded more than once per year.
[2] Not to be exceeded more than once per year on average over 3 years.
[3] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m^3.
[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m^3.
[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
[6] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard (0.08 ppm) to the 2008 ozone standard (0.075 ppm). EPA is in the process of reconsidering the standards set in 2008.
[7] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact Areas. The 1-hour ozone standard does not apply to the project area.
[8] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb.
[9] To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Minnesota also has established AAQS. For many pollutants and averaging periods, the MNAAQS have been made identical to NAAQS. There are subtle differences, and for some pollutants, Minnesota has a standard while no standard exists at a national level, including for hydrogen sulfide and particulate matter. While total particulate matter still has an official

standard, it is enforced more loosely with a primary emphasis on standards for PM_{10} and $PM_{2.5}$). For a complete listing on MNAAQS, please visit Minnesota's Office of the Revisor of Statutes' website (https://www.revisor.mn.gov/rules/?id=7009.0080).

Relative to the 2008 ozone standard, Minnesota Pollution Control Agency recommended to USEPA in a March 10, 2009 letter that the entire state be designated as attainment for the 2008 ozone standard. (Appendix F) EPA is in the process of reconsidering the standards set in 2008 and in January 2010 proposed to lower the 8-hour standard to somewhere between 0.060-0.070 ppm. If the standard were to be lowered to 0.060 ppm, with one exception, all counties that currently monitor for ozone in Minnesota would be classified in part or in whole as nonattainment based on 2006-2008 data , which indicate that 3-year average ozone levels in Minnesota ranged from 0.057 to 0.069. Given that ozone is a regional pollutant by nature, it is safe to assume that any of the counties involved in this project would ultimately be classified as nonattainment for a 0.060 ppm standard based on 2006-2008 data if monitoring were established for ozone within their boundaries. If the standard were to be lowered to 0.065 or 0.070 ppm, it is unclear as to which of the non-monitored counties involved in this project, if any, would be classified as nonattainment.

The only pollutants of concern relating to transmission line operations are O_3 and NO_x. However, transmission lines and substations do not produce significant amounts of these air pollutants, as the O_3 and NO_x emissions from a 345 kV transmission line result from corona effects and are very minor.

Corona consists of the breakdown or ionization of air in a few centimeters or less immediately surrounding conductors and can produce ozone and oxides of nitrogen in the air surrounding the conductor. For a 345 kV transmission line, the conductor gradient surface is usually below the air breakdown level. Typically, some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona. Ozone is not only produced by corona, but also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone from chemicals in the atmosphere. Ozone is a very reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short lived

7.10.2 Potential Impacts

Following is a description of impacts and mitigation with respect to air quality. The impacts and mitigation would be the same for the various alternative routes, options, and substations.

There are no differences in attainment status in any of the counties along any of the options. The options chosen should not impact air quality in a meaningful way.

During construction of the proposed transmission line and substation, there will be limited emissions due to exhaust from vehicles and other construction equipment and fugitive dust from right-of-way clearing. Temporary air quality impacts caused by construction-related

emissions are expected to occur during this phase of activity. Exhaust emissions, primarily from diesel equipment, will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts on the surrounding environment will be minimal because of the short and intermittent nature of the exhaust emission and dust-producing construction phases.

Along some portions of Route D, the proposed transmission line could be undergrounded. If undergrounding occurs in a given area, the effect of construction emissions will be different due to the differences in the type of equipment used. However, the exhaust emissions due to equipment operation or fugitive dust emissions from other associated operations will still be minimal and temporary.

7.10.3 Mitigation

According to the Applicant, Best Management Practices (BMPs) will be used to minimize or avoid temporary impacts from fugitive dust and other construction-related emissions. These BMPs may include:

- Oil and other petroleum derivatives will not be used for dust control. Speed limits will be enforced, based on road conditions, to reduce dust problems.
- Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, will not be operated until repairs or adjustments are made.
- Burning or burying waste materials on the ROW will not be permitted and all waste materials shall be disposed at permitted waste disposal areas or landfills.
- The emission of dust into the atmosphere during construction will be minimized to the extent practical during the manufacturing, handling, and storage of concrete aggregate. Methods and equipment will be used as necessary for the collection and disposal or prevention of dust during these operations. The methods of storing and handling cement and cement additives will also include means of minimizing atmospheric discharges of dust.

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8.0 PERMITS AND APPROVALS

There are several permits and approvals that must be obtained for the Project in addition to the state Route Permit. Below is a list and a brief description of permits and approvals that are required by local, state, and federal governments.

Table 8-1. Permits and Approvals

Permit	Jurisdiction
Local Approvals	
Road Crossing/ROW Permits	County, Township, City
Lands Permits	County, Township, City
Building Permits	County, Township, City
Over width Loads Permits	County, Township, City
Driveway/Access Permits	County, Township, City
Minnesota State Approvals	
Certificate of Need	Minnesota PUC
Route Permit	Minnesota PUC
Cultural and Historical Resources Review	Minnesota SHPO
Endangered Species Consultation	Minnesota DNR - Ecological Services
License to Cross Public Waters	Minnesota DNR - Lands and Minerals
Utility Permit	Mn/DOT
Wetland Conservation Act	BWSR
NPDES Permit	MPCA
Federal Approvals	
Section 10 Permit	USACE
Section 404 Permit	USACE
Permit to Cross Federal Aid Highway	FHWA
Notice of Proposed Construction (7460-1)	FAA
Notice of Actual Construction or Alteration	FAA
Farmland Protection Policy Act/Farmland Conversion Impact Rating	USDA/NRCS
Spill Prevention, Control and Countermeasure (SPCC) Plan	EPA
Compatibility Analysis of Disturbed Easements/Lands	USFWS

8.1 LOCAL APPROVALS

Typical local approvals associated with transmission line construction are listed below. Per Minnesota Statues 216E.10, the issuance of a route permit is the only approval required to be obtained by the utility for the location of the route. The Applicants would work with local, state, and federal governmental agencies to address concerns related with other required permits and approvals.

Road Crossing/ROW Permits

These permits may be required to cross or occupy county, township, and city road ROW.

Lands Permits

These permits may be required to occupy county, township, and city lands such as park lands, and other properties owned by these entities.

Building Permits

These permits may be required by the local jurisdictions for substation modifications and construction.

Over width/Loads Permits

These permits may be required to move over width or heavy loads on county, township, or city roads.

Driveway/Access Permits

These permits may be required to construct access roads or driveways from county, township or city roadways.

8.2 STATE OF MINNESOTA APPROVALS

Certificate of Need

Prior to issuance of a route permit, a Certificate of Need is required from the PUC.

Route Permit

HVTLs cannot be constructed without a route permit approved by the PUC.

Cultural and Historic Resources Review

A cultural and historic resources review was conducted by the Minnesota SHPO. This review assists the Applicants in identifying potential impacts to cultural and historic resources. Further studies may be conducted by the Applicant dependent on final route determination.

Endangered Species Consultation

The Minnesota DNR Natural Heritage and Nongame Research Program collects, manages, and interprets information about nongame species. Consultation was requested from the department for the Project regarding rare and unique species.

License to Cross Public Waters

The Minnesota DNR Division of Lands and Minerals regulates utility crossings over, under, or across any State land or public water identified on Public Waters and Wetlands Maps. A license to cross Public Waters is required under Minn. Stat. 84.415 and Minn. Rules 6135. The Applicants would file these permits once the design of the transmission line is complete and would acquire the permit prior to construction.

Utility Permit

A permit from the Mn/DOT is required for construction, placement, or maintenance of utility lines that occur adjacent to or across the highway ROW. The Applicants would file for these permits once the design of the transmission line is complete and would require the permit prior to construction.

NPDES Permit

A NPDES permit is required for stormwater discharges associated with the construction activities disturbing equal to greater than one acre. A requirement of the permit is to develop and implement a stormwater pollution prevention plan (SWPPP), which includes BMPs to minimize discharge of pollutants from the site. This permit would be acquired since the construction would cause a disturbance of greater than one acre for the whole of the Project.

8.3 FEDERAL APPROVALS

Section 10 Permit

The USACE regulates impacts to navigable waters of the U.S. The Red River is classified by the USACE as navigable water, and the Applicants would apply for a permit for each of the crossings proposed for the Project.

Section 404 Permit

A Section 404 permit is required from the USACE for discharges of dredged or fill material into waters of the U.S. The Applicants would apply for these permits once a route is awarded for the Project.

Notice of Proposed Construction

Notice and approval are required for structures 200 feet in height or the height of the structures would exceed a slope requirement as defined in the FAA Advisory Circular (AC 70/7460-2K). Form 7460-1 is required for the notice.

Notice of Actual Construction or Alteration

This is required to provide the FAA with final construction as-built information for their records, using Form 7460-2.

Farmland Protection Policy Act/Farmland Conversion Impact Rating

The intent of the Farmland Protection Policy Act is to minimize the conversion of farmland to nonagricultural uses by Federal projects. The Applicants would work with The Department of Agriculture to meet the requirements of this program.

Spill Prevention, Control and Countermeasure Plan

A Spill Prevention, Control and Countermeasure Plan is required to prevent discharge of oil into navigable waters of the U.S., and is required if the aboveground storage capacity for the substance is greater than 1,320 gallons and there is a reasonable expectation of a discharge into navigable waters of the U.S. The Applicants would update and develop their SPCC Plan at substations meeting the criteria per 40 CFR 112.

Compatibility Analysis of Disturbed Easements/Lands

This permit is required for work within easements owned by the USFWS. Compatibility is determined in accordance with the National Wildlife Refuge System Improvement Act. A compatible use is a wildlife-dependent recreational use or any other use on lands that in the sound professional judgment of the director would not materially interfere with or detract from the fulfillment of the mission of the USFWS (wildlife conservation) or purposes of the land. The Applicants would work closely with the USFWS on potential impacts to their lands.

9.0 REFERENCES

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